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Monterey , California



THESIS

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3-DIMENSIONAL STRESS ANALYSIS OF SUPERHEATER HEADERS

by

Jonathan D. Barnes

December 1989

Thesis Advisor

Gilles Cantin

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3-Dimensional Stress Analysis
of Superheater Headers

by

Jonathan D. Barnes

Lieutenant Commander, United States Navy
B.S., United States Merchant Marine Academy, June 1979

Submitted in partial fulfillment of the
requirements for the degree of

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December 1989

ABSTRACT

Naval Sea Systems Command (NAVSEA) initiated an investigation of the Tarawa class (LHA-1) superheater headers due to the reoccurrence of numerous cracks and leaks in the tube to header attachment welds.

A 3-dimensional solid finite element model was developed to simulate the superheater header geometry. ADINA, a finite element program for automatic dynamic incremental nonlinear analysis, is used to evaluate the stresses present in the header particularly the stresses that are present in the tube to header welds. The model that is used evaluates the stresses induced by both pressure and thermal loadings. This is part of a continuing study of high pressure and high temperature boiler components.

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I. INTRODUCTION

In recent years, the United States Navy has encountered problems with the superheater headers in the Combustion Engineering Company, type V2M, marine boilers that are fitted on the Tarawa class (LHA-1) ships. The problems encountered are numerous cracks and leaks that have developed in the tube to header attachment welds. This prompted Naval Sea Systems Command to begin an evaluation of these superheater headers in order to assess the cause of these failures and to generate corrective actions in order to minimize the down time of the ships and the cost of repairing these failures.

A 3-dimensional solid finite element model was developed using the ADINA program [Ref. 1: pp. 48-61] in order to perform a thermal stress analysis of the header in the region of the tube to header attachment welds.

This thesis will try to simulate, as close as can be determined, the actual conditions that the superheater headers are subjected to. This will include temperature dependent properties, combined loadings caused by boiler pressure coupled with a longitudinal temperature gradient and different initial temperatures of the header. The primary focus will be the induced stresses that are present in the tube to header attachment welds for 25° and 90° boiler loads.

II. DESCRIPTION OF THE PROBLEM

The Tarawa class (LHA-1) ships generate superheated steam for propulsion from two Combustion Engineering Company, type V2M, marine boilers. Each of these boilers are two drum, natural circulation, "D" type boilers fitted with an integral superheater, see Figure 1 on page 3. The boilers are rated at 628 psi with 904 degree F. superheater outlet conditions when operating at full power conditions.

The superheater is made up of 268 "U" shaped tubes that are inclined with the vertical and arranged such that there are 67 rows of tubes along the length of the header. The headers themselves are positioned such that they lie in a horizontal plane, see Figure 2 on page 4. The headers are 12.75 inch O.D. x 2.0 inch minimum wall thickness, 2.25 chrome pipe (ASME-SA-335-Grade P-22) and the tubes are 1.5 inch O.D. x 0.12 inch minimum wall thickness, seamless, 2.25 chrome tubing (MIL-T-16286, Class E) [Ref. 2: p. A-3]. The superheater is arranged such that once the steam has entered the superheater, it makes four passes before exiting (each pass consists of the steam flowing from the inlet-outlet header to the intermediate header or vice versa).

The tubes are lightly rolled into the tube holes of the header proper and then are seal welded internal to the header. These welds, referred to in this thesis as tube to header attachment welds, are the source of problems encountered that have prompted the investigation. The problems being linear defects that were discovered while performing magnetic particle inspections on the headers. The following description of the linear defects is a summary of the description given by Naval Sea Systems Command and those given by Lt. Doyle R. Kitchin [Ref. 1: p. 2]. The linear defects or cracks were oriented predominantly transverse to the longitudinal axis of the header; in other words, the cracks tended to propagate between tube to header attachment welds within the individual rows of tubes, but there were also a few exceptions where the crack propagated between tube to header attachment welds of adjacent rows. The majority of these linear defects were located in the inlet-outlet header as compared to the number of linear defects found in the intermediate header of the respective boiler. The linear defects found in the inlet-outlet header were concentrated in the first and the fourth passes (at the entrance and at the exit of the header). A more detailed description of the superheater geometry and the linear defects can be found in [Ref. 3: pp. 10 -15].

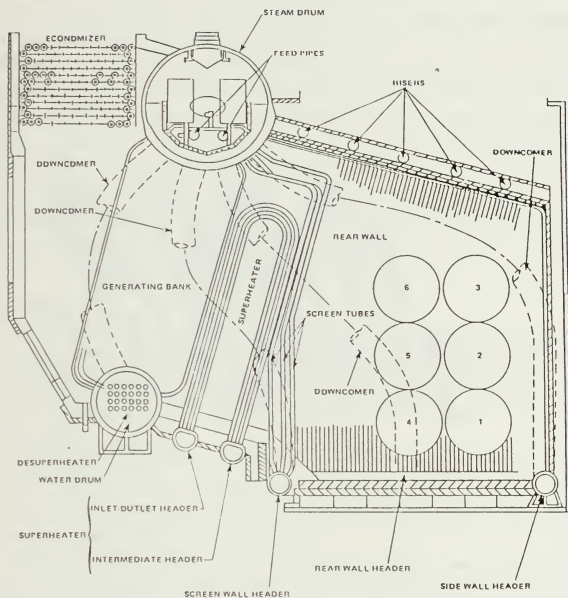


Figure 1. Cross section of the V2M boiler

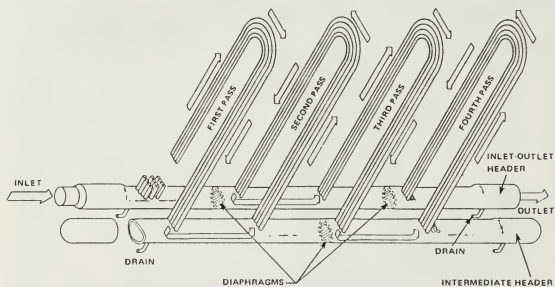


Figure 2. Arrangement of the Superheater

III. DESCRIPTION OF ADINA

ADINA, which stands for Automatic Dynamic Incremental Nonlinear Analysis, is a computer program that is designed to perform static and dynamic analysis in structural or solid mechanics, heat transfer, fluid flow, and other field problems that would lend themselves to a finite element analysis. ADINA uses a consistent set of units; forces are in pounds, stresses are in pounds per square inch, and displacements are in inches. The complete ADINA system consists of the programs ADINA for displacements and stress analysis, ADINA-F for the solution of fluid flow with heat transfer (ADINA-F was not used in this thesis and therefore it will not be discussed), ADINA-T for analysis of heat transfer in solids and structures and the solution of field problems, ADINA-IN for preparation and display of the input data and ADINA-PLOT for display of the calculated results [Ref. 4: p. 1]. The overall sequence of the ADINA system is shown in Figure 3 on page 6 which is taken from [Ref. 4: p. 2].

A. ADINA

The program ADINA [Ref. 4] is the central part of the ADINA system. ADINA is basically the problem solver of the ADINA system. ADINA performs the displacement and stress analysis for the given model. It is capable of generating a solution for static and dynamic, linear or nonlinear, problems in 1-dimension, 2-dimensions, or 3-dimensions.

ADINA has the capability of handling a varied selection of elements for different model geometries. ADINA will handle truss, 1-dimensional solid, 2-dimensional solid, 3-dimensional solid, isobeam, plate, shell, pipe, general spring, general mass stiffness, 2-dimensional and 3-dimensional fluid elements.

ADINA also has the capability of handling a wide variety of material types. It can handle elastic, orthotropic, thermo-elastic, concrete, plastic, thermo-plastic and fluid materials, just to name a few. These are easily programmed using simple commands.

ADINA allows the programmer to define contact surfaces. Contact surfaces are two or more surfaces that the programmer anticipates are in contact with each other or that could come into contact with each other during the solution of the problem.

ADINA will also perform a thermal stress analysis for a given model. ADINA uses the output form ADINA-T (which is discussed later) along with the proper material definition in order to perform these calculations.

Fracture mechanics, frequencies, mode shapes, and mode superpositions are other options that can be calculated from ADINA.

B. ADINA-IN

The preparation and checking of the input data for ADINA is done by the ADINA-IN portion of the ADINA system. ADINA-IN is the starting program for all models that are using the ADINA system. ADINA-IN can also be used to generate input data for the ADINA-T and ADINA-F programs. ADINA-IN can be used interactively or noninteractively (batch mode). The noninteractive option of ADINA-IN allows the programmer to define a large problem quite simply. This is done by writing an ADINA input file.

The ADINA input file is the file that contains all pertinent information about the model. This includes model coordinates, element types, material types, element loadings, type of analysis to be performed, contact surface definition, and boundary conditions. The model coordinates can be input in local or global coordinate systems using Cartesian, cylindrical, spherical or any combination of these. Meshes consisting of line, surface, or volume elements can be generated by the commands GLINE, GSURFACE, or GVOLUME respectively [Ref. 5: pp. 1-3]. These commands give the programmer the ability to define a minimal number of nodes in order to generate the model instead of having to define each nodal coordinate separately. ADINA-IN will automatically generate the rest of the nodes of the model based upon the type and number of nodes of the specified element that is used. ADINA-IN will also automatically number the rest of the nodes of the model.

The element loading can also be specified in the ADINA input file. The elements can be loaded in different ways; the LOADS ELEMENT command can be used to put pressure or distributed loads on the elements. The command LOADS TEMPERATURE or LOADS HEATFLUX can be used to describe the type of loading used in the heat transfer problem.

The type of material is also specified in the ADINA input file. Material types for the displacement, stress analysis or heat transfer problems are numerous, as mentioned previously. The versatility of the MATERIAL and the LOADS commands demonstrates how one input file for a given model can be used to solve a stress analysis, thermal stress analysis or heat transfer problem; it is just a matter of invoking the proper commands for the specific portion of the ADINA system that is to be used.

ADINA-IN also allows the programmer to take advantage of geometric symmetry in the given problem. If the geometry of the problem lends itself to that of a repeating section, ADINA-IN will allow the programmer to define the repeating section using the SUBSTRUCTURE command and then combine the same substructure numerous times using the REUSE command until the entire model is generated. There is one major disadvantage to using these commands and that is that only distributed or pressure loadings can be implemented in the problem.

ADINA-IN also has a graphics subroutine incorporated in it. The graphics standard used by ADINA-IN is GKS (Graphics Kernel System). This is a very useful tool to have because it allows the programmer to see what the model actually looks like at compilation time. In this way, the programmer can correct inaccuracies in the model prior to using another portion of the ADINA system. This graphics routine has the capability for hidden line removal which is very helpful when viewing a 3- dimensional model.

ADINA-IN will generate error messages as the errors are detected during the generation of the input data. In many cases, ADINA-IN takes corrective action in order to allow ADINA to be executed.

An optimization of the equation numbering is performed by ADINA-IN using the reverse Cuthill-McKee algorithm in order to reduce the bandwidth and profile of the stiffness and mass matrices [Ref. 5: pp. 1-5].

C. ADINA-T

ADINA-T, which stands for Automatic Dynamic Incremental Nonlinear Analysis of Temperatures, can be used for linear and nonlinear steady state or transient heat transfer problems to solve for the temperature distribution of a given model. ADINA-T is a compatible heat transfer analysis program to the stress analysis program ADINA. A specific feature of ADINA-T is that the same code can also be used to solve other field problems such as seepage, electric conduction, etc. [Ref. 6: pp. 1-2]. ADINA-T offers the programmer the ability to specify convection, radiation, temperatures, heatflux, initial conditions, or any combination of these as boundary conditions. ADINA-T offers the ability to utilize constant or temperature time dependent properties such as convection or conduction coefficients and if needed, phase changes can be incorporated into the model.

D. ADINA-PLOT

ADINA-PLOT [Ref. 7] is the portion of the ADINA system that is utilized for post-processing of resultant data from the ADINA program. ADINA-PLOT has the capacity to give the programmer graphics and display the results. The graphics standard used is the same as ADINA-IN, the Graphics Kernel System (GKS).

The graphics portion of ADINA-PLOT allows the programmer to see the undeformed model and the deformed model either as separate displays or on the same display. It also has the hidden line removal routine as does ADINA-IN but it must be kept in mind that hidden line removal is slow and is computationally expensive. ADINA-PLOT gives the programmer the ability to view the deformed and undeformed model in different colors; there is also a windowing feature that allows the programmer to zoom in on a particular part of the model.

The displaying of results can be accomplished in numerous ways. Results can be displayed in graphs, lists, scans or isobands. Graphs can be set up to show a comparison of any combination of results the programmer wishes. A listing of any of the results can be obtained and if the programmer wishes to see a listing of values that exceed a specified value, ADINA-PLOT will produce these using the scan feature. ADINA-PLOT will also produce plots of isobands in various colors, but presently, this is limited to 2-dimensional problems.

Further information about the ADINA system can be found in [Ref. 1].

IV. 3-DIMENSIONAL SOLID FINITE ELEMENT MODEL

The 3-dimensional model used in this thesis was developed by LCDR. Doyle R. Kitchin [Ref. 1: pp. 48-60]. The model was developed in order to study thermal stresses in the header. One tube row was chosen as the repeating section and this tube row was divided in half by passing a vertical plane through the tube row's longitudinal axis. The 3-dimensional model is shown in Figure 4 on page 11. The model consists of 288 elements and 1957 nodes. The element that was chosen for the model was the 20-node isoparametric solid element. Figure 5 on page 12 shows the 20-node isoparametric element. This element was chosen because it is able to approximate the curved geometry of the header. The following boundary conditions are imposed on the model. All nodes in the $Y=0$ plane were constrained to roll only within that plane. All of the nodes in the Z direction, from the origin, were fixed and the nodes in the positive X direction, from the origin, were constrained to roll only in the X direction.

The material of the header and tubes is considered to be 2.25 Chromium and 1.0 Molybdenum as discussed previously. An important assumption that must be understood is that the material used in the tube to header attachment weld is the same as the header and the tubes; it follows from this assumption that the weld properties are identical to those of the header and tubes.

Internal pressure applied to the header is assumed constant throughout the analysis. The internal pressure applied to the model is 700 psi, which is a worse case scenario of the operating conditions of the boiler [Ref. 3: p. 38].

A. PROGRAM SUPHTRTEMP.IN

Program SUPHTRTEMP.IN is a continuation from LCDR. Doyle R. Kitchin's model [Ref. 1: pp. 87-100]. In this program, the graphics portion for ADINA-IN was updated to the latest version of ADINA.

Program SUPHTRTEMP.IN is basically two programs incorporated into one ADINA input file. Program SUPHTRTEMP.IN is listed in Appendix A. The first portion of the program is to set up the data needed for ADINA-T in order to produce the temperature distribution of the header and the second portion of the program sets up the data needed by ADINA in order to produce the thermal stresses within the header. The procedure for executing Program SUPHTRTEMP.IN will be discussed later.

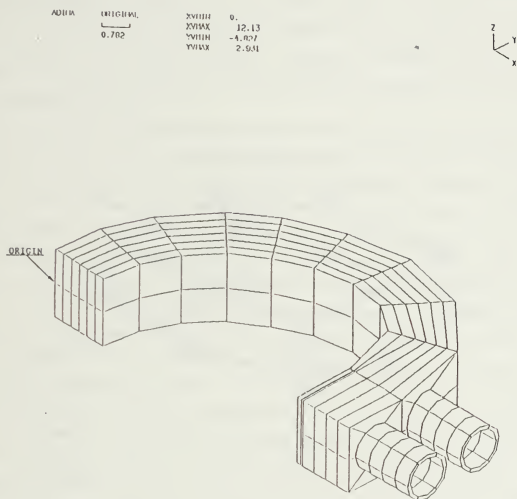


Figure 4. 3-Dimensional model of the repeating section

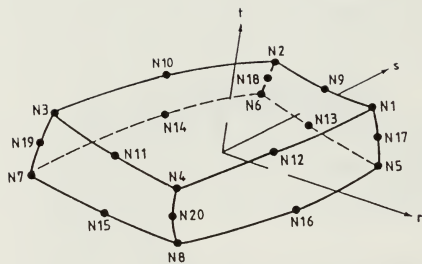


Figure 5. 20-node isoparametric element

The temperature portion of Program SUPHTRTEMP.IN is currently set up to perform a steady state analysis of the heat conduction equation [Ref. 6: pp. 3-5] in order to derive the temperature distribution of the header. This distribution is needed by ADINA for the thermal stress analysis. The thermal conductivity is not assumed to be constant during the solution of the temperature distribution; the values for the temperature dependence of thermal conductivity was taken from [Ref. 8: p. 652]. The reader is reminded that ADINA accepts temperature dependent thermal conductivity during the non linear part of the solution algorithm. The aspect of thermal conductivity being temperature dependent was introduced into the model to simulate the actual conditions that the header was subject to.

Four assumptions are made with respect to the temperature distribution of the header. First, the internal longitudinal temperature gradient of the header is assumed to be linear. This temperature gradient was derived by taking the difference between the inlet and outlet temperatures and dividing this by the distance between row 1 and row 67 of the header (the distance between row 1 and row 67 is 148.5 inches) [Ref. 2: Plan A-18]. The inlet temperature was taken to be 503 degrees F., which is the saturated steam temperature at 700 psi. The outlet temperature was taken from information provided by Naval Ship Systems Engineering Station, Philadelphia. Second, the longitudinal temperature gradient along the outside of the header was assumed to be linear. The same procedure was used to calculate the outside gradient applied to the model as the inside gradient discussed previously. The temperature data for the inlet and outlet regions of the outside of the header was also provided by Naval Ships Systems Engineering Station, Philadelphia. Third, the temperature gradient through the thickness of the header is assumed to be linear. Fourth, being that the tube thickness is relatively small compared to the header thickness, the tube is assumed to be at a constant temperature through the thickness. These assumptions were made in order to provide the boundary conditions for the solution of the heat conduction equation. The inner and outer temperature gradients provided the boundary conditions for the inner and outer surfaces of the model respectively. The thickness temperature gradient provides the boundary conditions for the edges of the model. These edge boundary conditions are derived by taking the difference between the inner and outer node temperatures of the respective edges. It should be noted that there are specified nodal temperatures at the midpoints of the model on both the inner and outer surfaces. At the two edges along the $Y=0$ plane, a value of heat flux equal to zero was imposed on the model unsuccessfully and therefore the linear temperature gradient assumption was assumed along these edges.

In actual practice, these boilers are kept on a 150 psi steam blanket (or close to this condition) when the boilers are secured. With this idea in mind, a 350 degree F. initial condition was placed on the header to simulate actual light off conditions of the boiler (350 degrees F. corresponds to a saturated steam temperature of 150 psi steam). This is an important concept in the conclusions of this thesis.

The second portion of Program SUPHTRTEMP.IN is set up to perform a static thermal stress analysis of the header. In this portion, the temperature distribution is used along with the internal pressure of the header in order to perform the thermal stress analysis. The two loading aspects, thermal and pressure, simulate the actual loading of the header. The only aspect of loading that is not incorporated into this model is the weight of the header; the reason that this condition was left out is discussed in the section that describes Program SUPHTR.IN. Pressure loading is only prescribed on the inner faces of the inner elements of the header in order to simulate the actual pressure loading. The thermo-elastic material selection was chosen for this model due to the fact that Young's Modulus and the linear coefficient of thermal expansion are both temperature dependent. It was felt that using this temperature dependency in the model would add some realism of the actual conditions that the header is subjected to. The data for how Young's Modulus varies with temperature for 2.25 Chromium and 1.0 Molybdenum was supplied by Naval Ship Systems Engineering Station, Philadelphia, but the data for how the linear coefficient of thermal expansion varied was taken from [Ref. 8: p. 653]. Contact surfaces are defined for the model due to the fact that the tube to header interface cannot be considered rigid. Even though the tube is welded to the header on the inner part of the header, the remaining length of the tube through the header is left free to movement. Contact surfaces are defined by ADINA as being surfaces that initially are in contact or that are anticipated to come into contact during the solution [Ref. 5: p. 5.19-2].

ADINA can use numerous types of convergence criteria. Normally by default, an energy convergence criteria [Ref. 5: p. 5.2-48] is used, but when contact surfaces are defined in a problem, convergence is also contingent upon the convergence of the contact surface forces [Ref. 5: p. 5.2-50]. For a small temperature change across the thickness of the header (10-20 degrees), the default contact surface force tolerance of 0.05 is satisfactory. If there is a large temperature change across the thickness of the header (50-100 degrees), the default contact surface force tolerance was too stringent. The program was running up to 90 or more hours on the VAX 2000 station trying to solve the problem. Therefore, it was decided to try to bracket the contact surface tolerance.

The values between 0.075 and 0.15 were found to yield 0.32 and 0.00 percent differences respectively when compared to the results of a tolerance of 0.1; the run time for these values were 30.7 and 22.9 hours respectively, a significant decrease as compared to the time at 0.05 tolerance. The tolerance of 0.075 was chosen to be used in the solution of the problem.

B. PROGRAM SUPHTRTEMP.PLOT

Program SUPHTRTEMP.PLOT is a program written in order to utilize ADINA-PLOT capabilities; a listing of Program SUPHTRTEMP.PLOT is in Appendix B. Program SUPHTRTEMP.PLOT is presently set up to give the user the normal and shear stress values for integration points of the elements that simulate the tube to header weld. Figure 6 on page 16 shows the tube to header arrangement as modeled. The tube to header weld is simulated as being the lower nodal points of the modeled tube, also as shown in Figure 6. The elements that model the lower tubes are elements 55 through 60 for the inner tube and elements 115 through 120 for the outer tube. Program SUPHTRTEMP.PLOT is also set up so that a file called SUPHTRTEMP.LIST is created that gives the stress values of the integration points for these elements. Along with these values, Program SUPHTRTEMP.PLOT will produce the undeformed header versus the deformed header superimposed upon each other in the same picture so an immediate comparison of the header before and after can be viewed.

C. PROGRAM SUPHTR.IN

The original direction of this thesis was to study the entire superheater inlet outlet header. Program SUPHTR.IN was the ADINA input file created to model the entire header; a listing of Program SUPHTR.IN is given in Appendix C. The use of the SUBSTRUCTURE and REUSE commands can be seen in the program. A main structure of the header was first defined. This consisted of defining the four corner nodal points of the repeating section in the $Y=0$ plane and then defining nodal points along the Z axis, also in the $Y=0$ plane, that would correspond to the corner points of the model spaced at a model's width apart. The main portion of the model is defined by the command SUBSTRUCTURE 0. The repeating section is defined by the command SUBSTRUCTURE 1. Now the REUSE command could be employed to link the model together to form the entire model (this program only models two repeating sections linked together). ADINA allows the programmer to utilize the REUSE command up to 99 times for a given substructure within the main structure [Ref. 5: p. 5.22-4].

ADENW ORIGINAL
0.129

XVHHH -2.000
XVMAX 0.
YVHHH 0.
YVMAX 2.250

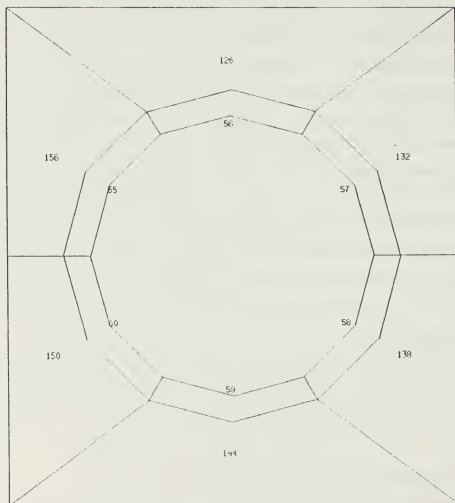


Figure 6. Tube to header arrangement

The program had to be abandoned due to the fact that ADINA is presently limited as to the types of problems that can be solved using the SUBSTRUCTURE and REUSE commands. Only problems using pressure or concentrated loadings can be solved using this technique. Problems using contact surfaces and thermal loads, as this thesis is involved with, can not be solved using the SUBSTRUCTURE and REUSE commands [Ref. 5: p. 5.22-2 and 5.22-3]. Therefore this thesis is restricted to evaluating specific regions of the inlet outlet header.

D. PROCEDURES FOR USING SUPHTRTEMP.IN AND SUPHTRTEMP.PLOT

These programs are set up to be used with the VAX/VMS operating system. It should be understood that any logical file name can be given to these files, but for the operation of ADINA, the ADINA input file must be named FILENAME.IN and the plot program must be named FILENAME.PLOT.

To run the problem, first the temperature distribution must be created. To do this, enter the editor with the ADINA input file SUPHTRTEMP.IN and place the corresponding nodal temperatures in the proper TIMEFUNCTION commands. Ensure that all data for ADINA is commented out (these areas can be found easily as there are instructions throughout Program SUPHTRTEMP.IN with the corresponding line numbers that tell which sections are needed for ADINA-T and ADINA). Also at the end of the file, there are two commands ADINA-T and ADINA. The command ADINA must be commented out in order to run ADINA-T. Exit the editor (saving this version of the input file) and at the system prompt, type @ADINAIN FILENAME. This runs ADINA-IN and will create a file named FILENAME.DAT. This is the data file that ADINA-T uses; again at the system prompt, type @ADINAT FILENAME. ADINA-T is now solving the temperature distribution. It is very important to note that all of the ADINA programs create numerous FOR*.DAT files during their respective operations. At the end of their respective runs, all of the FOR*.DAT file are automatically deleted. FOR056.DAT is the data file that contains the temperature distribution that is needed by ADINA to solve the thermal stress problem. The user should ensure that his/her ADINA-T command file is modified to rename FOR056.DAT to another name. I chose to modify my ADINA-T command file to rename FOR056.DAT to SUPHTRTEMP.TEMP.

After ADINA-T is completed, if you look in your directory, you will see that there are the following files, FILENAME.IN, FILENAME.DAT, FILENAME.PLOT, FILENAME.OUT, FILENAME.PORTHOLE, FILENAME.TEMP, and

FILENAME.RESTART. Delete from the directory FILENAME.DAT, FILENAME.OUT, FILENAME.PORHOLE, and FILENAME.RESTART. Enter the editor again with the ADINA input file FILENAME.IN. Comment out all the sections that are used with ADINA-T and comment in the sections that are used in ADINA. Comment out the command ADINA-T and comment in the command ADINA at the end of the file. Exit the editor (saving this version of FILENAME.IN). At the system prompt, type @ADINAIN FILENAME. This is creating FILENAME.DAT that will be the data file used by ADINA. After this is finished and the prompt appears, rename FILENAME.TEMP to FOR056.DAT. Now you are ready for ADINA; at the system prompt, type @ADINA FILENAME. ADINA is now solving the problem.

When ADINA is finished and the system prompt appears, type @ADINAPLOT FILENAME. This will execute FILENAME.PLOT, which will read the file FILENAME.PORHOLE; FILENAME.PORHOLE contains all the data of the problem. The results of the problem will be displayed. FILENAME.PLOT will also create a file named FILENAME.LIST, which contains the thermal stresses of the simulated tube to header attachment weld nodes. There is also a file named FILENAME.OUT created. This file contains all of the model data, initial conditions of the model, final nodal displacements and final nodal stresses for all of the nodes for the entire model. The actual run time of the ADINA problem can also be found in FILENAME.OUT at the end of the file.

If you wish to create a graphics file of the model, set OPTION=0 in the WORKSTATION command of FILENAME.IN and FILENAME.PLOT. If the graphics are preferred on the screen, set OPTION=1 in the WORKSTATION command.

V. RESULTS

As previously discussed, the entire superheater header could not be modeled. Therefore, it was decided that a modeled section in the first pass and a modeled section in the fourth pass would be used. The modeled section of the first pass was taken to be row 1 and for the fourth pass row 67 was used. The selection of these two rows was based on the fact that the inlet and outlet steam temperatures for the superheater header can be readily determined. It was also decided that system behavior at two steam flows would be evaluated, 25 percent and 90 percent steam flows. These steam flows seemed to yield the two extremes with respect to the inner and outer temperature gradients and the temperature gradient through the thickness of the header. Therefore for the 25 percent steam flow condition, a model of row 1 and a model of row 67 were evaluated and similarly for the 90 percent steam flow. There was one other model run; this was row 1 for 25 percent steam flow with the header starting from a 0 degree F. initial condition and a comparison was made to the same model except that a 350 degree F. initial condition was imposed on the model.

It must be understood that the stress values that are represented in this thesis are not nodal point stresses. They are the respective element integration point stresses for the 3- dimensional isoparametric element.

It also needs to be stated that the temperature data from Naval Ship Systems Engineering, Philadelphia for the first and fourth passes of the inlet outlet header was not very detailed. The temperature data used in this thesis was for the worst case temperature readings from this information.

As the following discussion of integration point stresses for the simulated elements for the tube to header attachment weld continues, refer to Figure 6 on page 16 in order to have a perspective of the geometry and location of the elements for the inner tube of the header. The same geometry consists for the outer tube of the header but with different element numbers.

A. 25 PERCENT STEAM FLOW

An inner longitudinal temperature gradient of 2.356 degrees F. per inch and an outer longitudinal temperature gradient of 1.911 F. degrees per inch were imposed on the model. A linear 10 degree temperature gradient was imposed on the upstream edge of the model for row 1. The temperature gradient on the downstream edge of the model

for row 1 was also assumed to be linear except these temperatures were defined by the inner and outer edge values of the model once the longitudinal temperature gradients inside and outside the model were imposed. The temperature gradients imposed on the model for row 67 were determined the same way except for the temperature gradients on the edges. There was an 80 degree temperature gradient imposed on the downstream edge of the model and the upstream edge temperatures were determined in the same manner as the downstream edge of the model for row 1. The tubes were assumed to have a uniform temperature of 503 F. degrees for the row 1 model and 850 degrees F. for the row 67 model.

The model for row 1 was run for a 0 degree F. initial condition and for a 350 degree F. initial condition of the header. As can be seen from Appendix D and Appendix E, the integration point stress values for the respective elements were the same, but for the sake of simulating the 150 psi steam layup of the boilers, it was decided to use the 350 degree initial condition for the rest of the evaluations.

The most significant result that can be drawn from this data is the very high values of the normal stresses in the Y direction for the majority of the integration points for elements 56 and 59 of the inner tube. Values above 40,000 psi are considered significant by this author. The value of 40,000 psi was used because it seems to represent an average value of yield stress. For the given steam flow, normal stresses in the Y direction of $6.35807\text{E}+04$ and $6.28656\text{E}+04$ were encountered for elements 56 and 59 respectively for the row 1 model. Values of $8.56997\text{E}+04$ and $8.43748\text{E}+04$ were encountered for elements 56 and 59 respectively for the row 67 model. The rest of the elements simulating the weld had integration point stress values below 40,000 psi. The elements simulating the weld for the outer tube also were found to have integration point stress values below the 40,000 psi value. These values can be seen in Appendix E and Appendix F.

The deformed versus the undeformed header can be seen in Figure 7 on page 22 for the row 1 model and Figure 8 on page 23 for the row 67 model respectively. The undeformed header is represented by the solid lines and the deformed header is shown with dotted lines. It should be noted that both figures look exactly the same, but there are differences in nodal point displacements. These differences are too small to show any significant change in the figures.

B. 90 PERCENT STEAM FLOW

An inner longitudinal temperature gradient of 2.54 degrees F. per inch and an outer longitudinal temperature gradient of 2.0 degrees F. per inch were imposed on the model. A linear 20 degree temperature gradient was imposed on the upstream edge of the model for row 1 and a 100 degree temperature gradient was imposed on the downstream edge of the model for row 67. The same procedure was used for assigning temperatures for the downstream edge of the row 1 model and the upstream edge of the row 67 model as was done for the 25 percent steam flow case. The tubes were also assumed to have uniform temperatures of 503 degrees F. for the row 1 model and 880 degrees F. for the row 67 model.

It was found again that elements 56 and 59 of the inner tube had normal integration point stresses in the Y direction above the 40,000 psi value. This data can be seen in Appendix G for the row 1 model and Appendix H for the row 67 model. For the row 1 model, normal integration point stresses in the Y direction were as high as $6.12707\text{E}+04$ and $6.05892\text{E}+04$ for elements 56 and 59 respectively for the inner tube. For the row 67 model, the inner tube normal integration point stresses in the Y direction were as high as $8.39943\text{E}+04$ and $8.26567\text{E}+04$ for elements 56 and 59 respectively. As was the case for the 25 percent steam flow, the elements that simulated the weld for the outer tube were all found to have integration point stresses less than the 40,000 psi value.

The deformed versus the undeformed header can be seen in Figure 9 on page 24 for the row 1 model and Figure 10 on page 25 for the row 67 model. It should also be kept in mind that even though the figures look the same, there is a small difference in the nodal point displacements that are not able to be seen in these two figures.

ADINA
LOAD STEP
TIME 1.000

ORIGINAL
0.8425

DEFORMED
0.03413

XMIN -0.2175
XMAX 14.05
YMIN -7.682
YMAX 6.07700

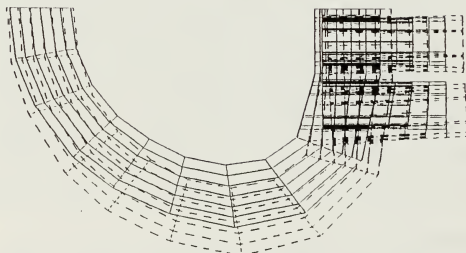


Figure 7. Row 1 model for 25% steam flow

ADINA
LOAD STEP
TIME 1.000

ORIGINAL
0.8932

DEFORMED
0.05781

XVMIN -0.2126
XVMAX 14.09
YVMIN -7.084
YVMAX 0.06279

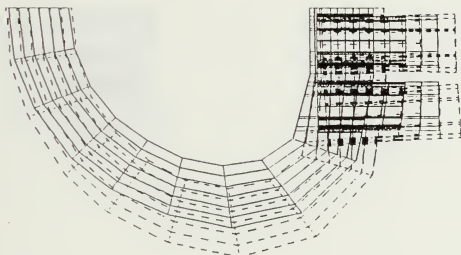


Figure 8. Row 67 model for 25% steam flow

ADINA	061614W.	REFORMED	SMIN	-0.2176
LOAD_STEP			SMAX	14.07
TIME 1.000	0.8928	0.03376	VMIN	-7.083
			VMAX	0.05806

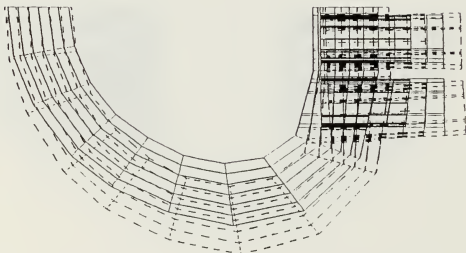


Figure 9. Row 1 model for 90% steam flow

ADINA
LOAD_STEP
TIME 1.000

ORIGINAL
0.0342

DEFORMED
0.05937

XMIN -0.2122
XMAX 14.02
YMIN -7.034
YMAX 0.06346

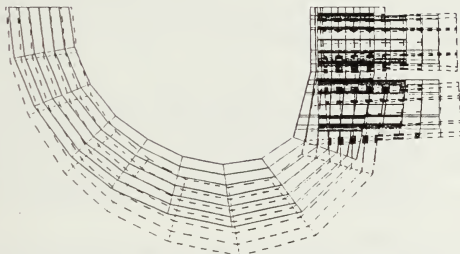


Figure 10. Row 67 model for 90% steam flow

VI. CONCLUSIONS

A. DISCUSSION OF THE RESULTS

The results have shown that there is definitely a problem region located in elements 56 and 59 of the simulated tube to header attachment weld for the inner tube, please refer to Figure 6 on page 16 to see these locations. It is believed the linear defects start within these elements. These boilers are operated in such a manner that steady state steaming is not always maintained. The steam flow rates are quite often varied in a cyclic way; by no means does the author intend that the cyclic pattern is repeated the same way each time. It is due to the cyclic steam flow rates and the high values of the stresses found in the simulated weld elements that leads to the idea that low cycle fatigue is present within these headers. It is also the author's belief that once the defect is initiated, that the stress distribution changes within the tube to header attachment weld thereby locating these high stress values at a different location where another defect can start.

The results also show that the temperature gradient across the thickness of the header along with the longitudinal temperature gradient effects the stress levels induced in the header. As can be seen, the integration point stresses are higher for the 25 percent steam flow when compared to the 90 percent steam flow, but in both cases, elements 56 and 59 of the inner tube do exhibit normal integration point stresses in the Y direction that are high.

It is also the author's belief that the 150 psi steam blanket placed on the idle boilers provides a type of stress relief to the tube to header attachment weld. This coupled with the redistribution of the stresses in the header, once a defect develops, could explain why it takes a period of time for numerous defects to appear.

As a final comment to the reader, one must keep in mind that the stress values presented in this thesis are stresses at the Gauss integration points within each element. These values do seem excessive until one remembers that the nodal point stresses are extrapolated from their neighboring integration point stresses. Until these extrapolated nodal point stresses are calculated and reviewed, it will be hard to determine whether the stresses in these headers are marginal or excessive. An extrapolation program was not developed in this investigation due to time limitations. Convergence studies have not been formally conducted in this investigation due to time limitations.

B. OPPORTUNITIES FOR FURTHER RESEARCH

The ADINA program is a versatile finite element program, but it does have some disadvantages. One such disadvantage is that if the programmer uses any material other than elastic, orthotropic or Mooney-Rivlin material, a nodal stress output table cannot be generated. All of the stresses that have been discussed in this thesis deal with stresses that are present at the Gauss integration points of the elements. The next step in this research would be to develop a 3-dimensional computer program that would extrapolate the nodal point stresses from the Gauss integration point stresses. To do this, the coordinates of the integration points needs to be known. Figure 11 on page 28 shows an example of integration point labeling used by ADINA for a 3- dimensional solid element. It should be kept in mind that this figure is not representative of the 20 node isoparametric element used in this thesis. Figure 12 on page 29 shows the coordinates of the Gauss integration point numbering system. The convention for the integration point numbering is as follows. The first integration of the element is the point with the most negative location of r , s and t and this is denoted by $INR = 1$, $INS = 1$, $INT = 1$. The next integration point is located by increasing t successively up to its maximum positive value, then increasing s one position in the positive direction and varying t from its maximum negative value to its maximum positive value, and so on [Ref. 4: pp. XIII-14 to XIII-17]. With the integration point coordinates and the integration point stresses for the elements, the nodal point stresses can be extrapolated.

A steady state analysis was performed in this thesis, but the transient temperature loading should be evaluated. In order to do the transient loading, or even a more accurate steady state analysis, better temperature data needs to be obtained along the entire length of the header so that less assumptions are made and more actual conditions can be incorporated into the model.

A defect should be modeled into the tube to header attachment weld and the stress redistribution of the header evaluated again. Another area of research could be the study of creep within the header. Further research should also incorporate a pressure gradient across the header in order to simulate the increase in steam flow rates.

This report has attempted to incorporate as much of the actual environment of the superheater header as was permissible in the given time allotted for this research. It is hoped that further investigations can be made in order to solve this problem and any other similar problems that may be encountered.

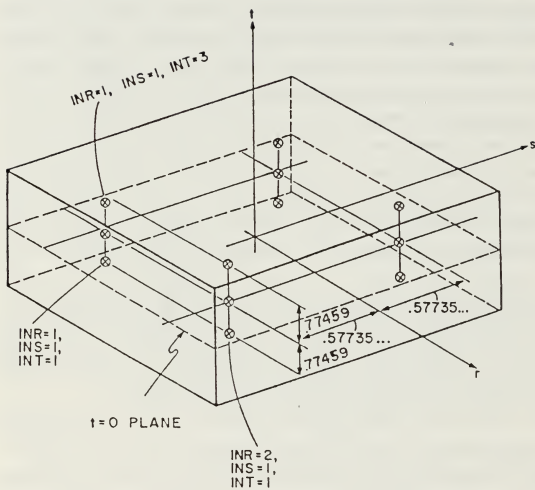


Figure 11. Integration point labeling

Order	Labels INR, INS and INT	r,s or t coordinate
1	1	.00000 00000 000
2	1	- .57735 02691 896
	2	.57735 02691 896
3	1	- .77459 66692 415
	2	.00000 00000 000
	3	.77459 66692 415
4	1	- .86113 63115 941
	2	- .33998 10435 849
	3	.33998 10435 849
	4	.86113 63115 941
5	1	- .90617 98459 387
	2	- .53846 93101 057
	3	.00000 00000 000
	4	.53846 93101 057
	5	.90617 98459 387
6	1	- .93246 95142 032
	2	- .66120 93864 663
	3	- .23861 91860 832
	4	.23861 91860 832
	5	.66120 93864 663
	6	.93246 95142 032

Figure 12. Gauss integration point numbering

APPENDIX A. ADINA INPUT FILE: SUPHTRTEMP.IN

```

*
*  -- ADINA INPUT FILE FOR 3D-HEADER --
*
*
* THIS PROGRAM IS THE MODEL FOR THE LHA-1 SUPERHEATER HEADER
*
*
* CONTROL INFORMATION
*
* FILEUNITS LIST=6 LOG=6 ECHO=6
* CONTROL ORIGIN=UPPERLEFT
*
*
* DATABASE CREATE
*
*
* *** ADINA CONTROL INFORMATION
*
* HEADING '3D-SUPERHEATER HEADER'
*
*
* *** MASTER DEGREES OF FREEDOM ARE DEFINED
*
*
* *****ADINA CONTROL INFORMATION, COMMENT LINES 27:32
*
* MASTER IDOF=000111 ITP56=1
* PORTHOLE VOL=MAX FORMATTED=YES FILE=60
* PRINTOUT VOLUME=MAXIMUM
* KINEMATICS DISP=LARGE STRAINS=SMALL
* ANALYSIS TYPE=STATIC
* TOLERANCES RCTOL=0.075 ITEMAX=25
*
*
* *** ADINA-T CONTROL INFORMATION, COMMENT LINES 36:102
*
* ***** FEPROGRAM PROGRAM=ADINA-T
* ***** PRINTOUT VOLUME=MAXIMUM
* ***** PORTHOLE FORMATTED=YES
* ***** MASTER ITP56=1
* ***** ANALYSIS TYPE=STEADY
* ***** TIMESTEP
* ***** 1***1.
*
*
* THESE TIMEFUNCTIONS DEFINE THE LOW TEMP. SIDE OF THE MODEL
*
* ***** TIMEFUNCTION 1
* *****0.***874.3
* *****1.***874.3
* ***** TIMEFUNCTION 3
* *****0.***657.8
* *****1.***857.8

```

```

***** TIMEFUNCTION 4
*****0.***841.4
*****1.***841.4
***** TIMEFUNCTION 5
*****0.***824.9
*****1.***824.9
***** TIMEFUNCTION 6
*****0.***808.4
*****1.***808.4
***** TIMEFUNCTION 7
*****0.***792.0
*****1.***792.0
***** TIMEFUNCTION 8
*****0.***775.5
*****1.***775.5
*
**  THESE TIMEFUNCTIONS DEFINE THE HIGH TEMP. SIDE OF THE MODEL
*
***** TIMEFUNCTION 2
*****0.***880.0
*****1.***880.0
***** TIMEFUNCTION 9
*****0.***863.3
*****1.***863.3
***** TIMEFUNCTION 10
*****0.***846.7
*****1.***846.7
***** TIMEFUNCTION 11
*****0.***830.0
*****1.***830.0
***** TIMEFUNCTION 12
*****0.***813.3
*****1.***813.3
***** TIMEFUNCTION 13
*****0.***796.7
*****1.***796.7
***** TIMEFUNCTION 14
*****0.***780.0
*****1.***780.0
*
**  THIS TIMEFUNCTION DEFINED THE MIDNODES FOR THE INNER PART OF THE HEADER
*
***** TIMEFUNCTION 15
*****0.***877.2
*****1.***877.2
*
**  THIS TIMEFUNCTION DEFINES THE MIDNODES FOR THE OUTER PART OF THE HEADER
*
***** TIMEFUNCTION 16
*****0.***777.8
*****1.***777.8
*
*****WORKSTATION  SYSTEM=4  DEVICE=0  OPTION=0
*

```

***** THE MATERIAL PROPERTIES ARE DEFINED

* COMMENT LINES 110:116

*****MATERIAL 1 TYPE=TEMPDEP-K

*****70.0 20.70

*****200.0 21.16

*****400.0 21.40

*****600.0 20.93

*****800.0 20.0

*****900.0 19.3

*

***** THE TEMPERATURES ARE IN DEGREES F

* COMMENT LINES 120:126

MATERIAL 1 THERMO-ELASTIC TREF=0.0

70.0 29900000 0.3 0.00000644

200.0 29500000 0.3 0.00000672

400.0 28600000 0.3 0.00000706

600.0 27400000 0.3 0.00000739

800.0 25700000 0.3 0.00000761

900.0 24500000 0.3 0.00000772

*

*

***** THE ELEMENT IS DEFINED

*

***** EGROUP 1 THREECONDUCTION M=1

EGROUP 1 THREEDSOLID M=1

STRESSTABLES 1 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

EDATA/ENTRIES EL TABLE PRINT

1 1 YES

STEP 1 TO

288 1 YES

*

*

***** THE COORDINATES FOR THE INNER TUBE ARE DEFINED

*

SYSTEM 1 TYPE=CYLINDRICAL X=9.4 Y=1.0 Z=1.125

COORDINATES/ENTRIES	NODE	R	THETA	XL
	1	0.63	0	0.0
	2	0.75	0	0.0
	3	0.63	0	0.156
	4	0.75	0	0.156
	5	0.63	0	0.218
	6	0.75	0	0.218
	7	0.63	0	2.0
	8	0.75	0	2.0
	9	0.63	0	4.0
	10	0.75	0	4.0
	11	0.75001	0	2.0

LINE CYLINDRICAL 1 1 6 1

LINE CYLINDRICAL 2 2 6 1

LINE CYLINDRICAL 3 3 6 1

LINE CYLINDRICAL 4 4 6 1

LINE CYLINDRICAL 5 5 6 1

LINE CYLINDRICAL 6 6 6 1

LINE CYLINDRICAL 7 7 6 1

LINE CYLINDRICAL 8 8 6 1

LINE CYLINDRICAL 9 9 6 1

LINE CYLINDRICAL 10 10 6 1
 LINE CYLINDRICAL 11 11 6 1

☆
 ☆

☆☆☆ THE MESH FOR THE INNER TUBE IS GENERATED

☆

GVOLUME 10 10 9 9 8 8 7 7 EL1=6 EL2=1 EL3=4 NO=20
 GVOLUME 8 8 7 7 6 6 5 5 EL1=6 EL2=1 EL3=4 NO=20
 GVOLUME 6 6 5 5 4 4 3 3 EL1=6 EL2=1 EL3=1 NO=20
 GVOLUME 4 4 3 3 2 2 1 1 EL1=6 EL2=1 EL3=1 NO=20

☆
 ☆

☆☆☆ THE COORDINATES FOR THE OUTER TUBE ARE DEFINED

☆

SYSTEM 2 TYPE=CYLINDRICAL X=9.4 Y=3.0 Z=1.125
 COORDINATES/ENTRIES NODE R THETA XL

463	0.63	0	-0.4564
464	0.75	0	-0.49
465	0.63	0	-0.09327705
466	0.75	0	-0.11162873
479	0.63	180	-0.1036
490	0.75	180	-0.07
467	0.63	0	0.218
468	0.75	0	0.218
469	0.63	0	1.64381482
470	0.75	0	1.61759259
471	0.63	0	4.0
472	0.75	0	4.0
473	0.75001	0	1.61759041
589	0.75001	180	1.94537256
474	0.63	30	-0.43276688
475	0.63	60	-0.3682
476	0.63	90	-0.28
477	0.63	120	-0.1918
478	0.63	150	-0.12723312
480	0.63	210	-0.12723312
481	0.63	240	-0.1918
482	0.63	270	-0.28
483	0.63	300	-0.3682
484	0.63	330	-0.43276688
485	0.75	30	-0.46186535
486	0.75	60	-0.385
487	0.75	90	-0.28
488	0.75	120	-0.175
489	0.75	150	-0.09813465
491	0.75	210	-0.09813465
492	0.75	240	-0.175
493	0.75	270	-0.28
494	0.75	300	-0.385
495	0.75	330	-0.46186535
584	0.75001	30	1.63954765
585	0.75001	60	1.69953594
586	0.75001	90	1.78148148
587	0.75001	120	1.86342702
588	0.75001	150	1.92341531
590	0.75001	210	1.92341531

591	0.75001	240	1.86342702
592	0.75001	270	1.78148148
593	0.75001	300	1.69953594
594	0.75001	330	1.63954765
496	0.63	30	-0.08036908
497	0.63	60	-0.04510387
498	0.63	90	0.0030693
499	0.63	120	0.05124247
500	0.63	150	0.08650768
501	0.63	180	0.09941564
502	0.63	210	0.08650768
503	0.63	240	0.05124247
504	0.63	270	0.0030693
505	0.63	300	-0.04510387
506	0.63	330	-0.08036908
507	0.75	30	-0.09626212
508	0.75	60	-0.05427972
509	0.75	90	0.0030693
510	0.75	120	0.06041831
511	0.75	150	0.10240071
512	0.75	180	0.11776732
513	0.75	210	0.10240071
514	0.75	240	0.06041831
515	0.75	270	0.0030693
516	0.75	300	-0.05427972
517	0.75	330	-0.09626212
540	0.63	30	1.66225867
541	0.63	60	1.71264813
542	0.63	90	1.78148148
543	0.63	120	1.85031484
544	0.63	150	1.9007043
545	0.63	180	1.91914817
546	0.63	210	1.9007043
547	0.63	240	1.85031484
548	0.63	270	1.78148148
549	0.63	300	1.71264813
550	0.63	330	1.66225867
551	0.75	30	1.63954951
552	0.75	60	1.69953704
553	0.75	90	1.78148148
554	0.75	120	1.86342593
555	0.75	150	1.92341346
556	0.75	180	1.94537037
557	0.75	210	1.92341346
558	0.75	240	1.86342593
559	0.75	270	1.78148148
560	0.75	300	1.69953704
561	0.75	330	1.63954951

☆

LINE NODES 463 463 474 475
 476 STEP 1 TO 484
 LINE NODES 464 464 485 486
 487 STEP 1 TO 495
 LINE NODES 465 465 496 497
 498 STEP 1 TO 506
 LINE NODES 466 466 507 508

509 STEP 1 TO 517
 LINE CYLINDRICAL 467 467 6 1
 LINE CYLINDRICAL 468 468 6 1
 LINE NODES 469 469 540 541
 542 STEP 1 TO 550
 LINE NODES 470 470 551 552
 553 STEP 1 TO 561
 LINE CYLINDRICAL 471 471 6 1
 LINE CYLINDRICAL 472 472 6 1
 LINE NODES 473 473 584 585
 586 STEP 1 TO 594

*

*

*** THE MESH FOR THE OUTER TUBE IS GENERATED

*

GVOLUME 472 472 471 471 470 470 469 469 EL1=6 EL2=1 EL3=4 NO=20
 GVOLUME 470 470 469 469 468 468 467 467 EL1=6 EL2=1 EL3=4 NO=20
 GVOLUME 468 468 467 467 466 466 465 465 EL1=6 EL2=1 EL3=1 NO=20
 GVOLUME 466 466 465 465 464 464 463 463 EL1=6 EL2=1 EL3=1 NO=20

*

*

*** THE COORDINATES FOR THE HEADER AROUND THE TUBES ARE DEFINED

*

SYSTEM 3 TYPE=CARTESIAN X=9.4 Y=0 Z=0

*

*** INNER TUBE HEADER NODES

*

COORDINATES/ENTRIES	NODES	X	Y	Z
	925	0.0	0.0	0.0
	926	0.156	0.0	0.0
	927	0.218	0.0	0.0
	928	2.0	0.0	0.0
	929	0.0	0.0	1.125
	930	0.156	0.0	1.125
	931	0.218	0.0	1.125
	932	2.0	0.0	1.125
	933	0.0	0.0	2.25
	934	0.156	0.0	2.25
	935	0.218	0.0	2.25
	936	2.0	0.0	2.25
	937	0.0	2.0	0.0
	938	0.156	2.0	0.0
	939	0.218	2.0	0.0
	940	2.0	2.0	0.0
	941	0.0	2.0	1.125
	942	0.156	2.0	1.125
	943	0.218	2.0	1.125
	944	2.0	2.0	1.125
	945	0.0	2.0	2.25
	946	0.156	2.0	2.25
	947	0.218	2.0	2.25
	948	2.0	2.0	2.25

*

*** NODES OF THE CENTERS OF THE TUBES FOR MESH GENERATION

*

949	0.0	1.0	1.125
-----	-----	-----	-------

950	0.156	1.0	1.125
951	0.218	1.0	1.125
952	2.0	1.0	1.125
953	0.0	3.0	1.125
954	0.156	3.0	1.125
955	0.218	3.0	1.125
956	2.0	3.0	1.125

*

*** NODES FOR THE OUTER TUBE HEADER

*

1230	1.41	4.7	2.25
1231	0.218	4.2764467	2.25
1232	-0.171	4.13822335	2.25
1233	-0.56	4.0	2.25
1234	1.41	4.7	1.125
1235	0.218	4.2764467	1.125
1236	-0.171	4.13822335	1.125
1237	-0.56	4.0	1.125
1238	1.41	4.7	0.0
1239	0.218	4.2764467	0.0
1240	-0.171	4.13822335	0.0
1241	-0.56	4.0	0.0

*

*** GENERATION OF THE MESH FOR THE INNER TUBE HEADER

*

LINE NODES 123 125 124
 LINE ARC 68 70 NCEN=951 EL=1 M=1 NCO=ALL
 LINE ARC 46 48 NCEN=950 EL=1 M=1 NCO=ALL
 LINE ARC 24 26 NCEN=949 EL=1 M=1 NCO=ALL
 GVOLUME 948 936 125 123 947 935 70 68 EL1=1 EL2=1 EL3=4 NC=N
 GVOLUME 947 935 70 68 946 934 48 46 EL1=1 EL2=1 EL3=1 NC=A
 GVOLUME 946 934 48 46 945 933 26 24 EL1=1 EL2=1 EL3=1 NC=A

*

LINE NODES 125 127 126
 LINE ARC 70 72 NCEN=951 EL=1 M=1 NCO=ALL
 LINE ARC 48 50 NCEN=950 EL=1 M=1 NCO=ALL
 LINE ARC 26 28 NCEN=949 EL=1 M=1 NCO=ALL
 GVOLUME 936 932 127 125 935 931 72 70 EL1=1 EL2=1 EL3=4 NC=N
 GVOLUME 935 931 72 70 934 930 50 48 EL1=1 EL2=1 EL3=1 NC=A
 GVOLUME 934 930 50 48 933 929 28 26 EL1=1 EL2=1 EL3=1 NC=A

*

LINE NODES 127 129 128
 LINE ARC 72 74 NCEN=951 EL=1 M=1 NCO=ALL
 LINE ARC 50 52 NCEN=950 EL=1 M=1 NCO=ALL
 LINE ARC 28 30 NCEN=949 EL=1 M=1 NCO=ALL
 GVOLUME 932 928 129 127 931 927 74 72 EL1=1 EL2=1 EL3=4 NC=N
 GVOLUME 931 927 74 72 930 926 52 50 EL1=1 EL2=1 EL3=1 NC=A
 GVOLUME 930 926 52 50 929 925 30 28 EL1=1 EL2=1 EL3=1 NC=A

*

LINE NODES 129 131 130
 LINE ARC 74 76 NCEN=951 EL=1 M=1 NCO=ALL
 LINE ARC 52 54 NCEN=950 EL=1 M=1 NCO=ALL
 LINE ARC 30 32 NCEN=949 EL=1 M=1 NCO=ALL
 GVOLUME 928 940 131 129 927 939 76 74 EL1=1 EL2=1 EL3=4 NC=N
 GVOLUME 927 939 76 74 926 938 54 52 EL1=1 EL2=1 EL3=1 NC=A

```

GVOLUME 926 938 54 52 925 937 32 30 EL1=1 EL2=1 EL3=1 NC=A
*
LINE NODES 131 11 132
LINE ARC 76 6 NCEN=951 EL=1 M=1 NCO=ALL
LINE ARC 54 4 NCEN=950 EL=1 M=1 NCO=ALL
LINE ARC 32 2 NCEN=949 EL=1 M=1 NCO=ALL
GVOLUME 940 944 11 131 939 943 6 76 EL1=1 EL2=1 EL3=4 NC=N
GVOLUME 939 943 6 76 938 942 4 54 EL1=1 EL2=1 EL3=1 NC=A
GVOLUME 938 942 4 54 937 941 2 32 EL1=1 EL2=1 EL3=1 NC=A
*
LINE NODES 11 123 122
LINE ARC 6 68 NCEN=951 EL=1 M=1 NCO=ALL
LINE ARC 4 46 NCEN=950 EL=1 M=1 NCO=ALL
LINE ARC 2 24 NCEN=949 EL=1 M=1 NCO=ALL
GVOLUME 944 948 123 11 943 947 68 6 EL1=1 EL2=1 EL3=4 NC=N
GVOLUME 943 947 68 6 942 946 46 4 EL1=1 EL2=1 EL3=1 NC=A
GVOLUME 942 946 46 4 941 945 24 2 EL1=1 EL2=1 EL3=1 NC=A
*
*** GENERATION OF THE MESH FOR THE OUTER TUBE HEADER
*
LINE NODES 587 589 588
LINE NODES 532 534 533
LINE NODES 510 512 511
LINE NODES 488 490 489
GVOLUME 948 944 589 587 947 943 534 532 EL1=1 EL2=1 EL3=4 NC=N
LINE NODES 532 510 891
GVOLUME 947 943 534 532 946 942 512 510 EL1=1 EL2=1 EL3=1 NC=A
LINE NODES 510 488 909
GVOLUME 946 942 512 510 945 941 490 488 EL1=1 EL2=1 EL3=1 NC=A
*
LINE NODES 589 591 590
LINE NODES 534 536 535
LINE NODES 512 514 513
LINE NODES 490 492 491
GVOLUME 944 940 591 589 943 939 536 534 EL1=1 EL2=1 EL3=4 NC=N
LINE NODES 536 514 893
GVOLUME 943 939 536 534 942 938 514 512 EL1=1 EL2=1 EL3=1 NC=A
LINE NODES 514 492 911
GVOLUME 942 938 514 512 941 937 492 490 EL1=1 EL2=1 EL3=1 NC=A
*
LINE NODES 591 593 592
LINE NODES 536 538 537
LINE NODES 514 516 515
LINE NODES 492 494 493
GVOLUME 940 1238 593 591 939 1239 538 536 EL1=1 EL2=1 EL3=4 NC=N
LINE NODES 538 516 894
GVOLUME 939 1239 538 536 938 1240 516 514 EL1=1 EL2=1 EL3=1 NC=A
LINE NODES 516 494 912
GVOLUME 938 1240 516 514 937 1241 494 492 EL1=1 EL2=1 EL3=1 NC=A
*
LINE NODES 593 473 594
LINE NODES 538 468 539
LINE NODES 516 466 517
LINE NODES 494 464 495
GVOLUME 1238 1234 473 593 1239 1235 468 538 EL1=1 EL2=1 EL3=4 NC=N
GVOLUME 1239 1235 468 538 1240 1236 466 516 EL1=1 EL2=1 EL3=1 NC=A

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GVOLUME 1240 1236 466 516 1241 1237 464 494 EL1=1 EL2=1 EL3=1 NC=A
*
LINE NODES 473 585 584
LINE NODES 468 530 529
LINE NODES 466 508 507
LINE NODES 464 486 485
GVOLUME 1234 1230 585 473 1235 1231 530 468 EL1=1 EL2=1 EL3=4 NC=N
LINE NODES 530 508 890
GVOLUME 1235 1231 530 468 1236 1232 508 466 EL1=1 EL2=1 EL3=1 NC=A
LINE NODES 508 486 908
GVOLUME 1236 1232 508 466 1237 1233 486 464 EL1=1 EL2=1 EL3=1 NC=A
*
LINE NODES 585 587 586
LINE NODES 530 532 531
LINE NODES 508 510 509
LINE NODES 486 488 487
GVOLUME 1230 948 587 585 1231 947 532 530 EL1=1 EL2=1 EL3=4 NC=N
GVOLUME 1231 947 532 530 1232 946 510 508 EL1=1 EL2=1 EL3=1 NC=A
GVOLUME 1232 946 510 508 1233 945 488 486 EL1=1 EL2=1 EL3=1 NC=A
*
*
*** THE COORDINATES FOR THE REST OF THE HEADER ARE DEFINED
*
SYSTEM N=0
*
COORDINATES/ENTRIES  NODE  X      Y      Z
1366  9.09  6.32  0.0
1367  9.09  6.32  2.25
1368  7.86  4.67  0.0
1369  7.86  4.67  2.25
1370  6.9   6.79  0.0
1371  6.9   6.79  2.25
1372  6.644 4.85  0.0
1373  6.644 4.85  2.25
1374  4.91  6.37  0.0
1375  4.91  6.37  2.25
1376  5.39  4.6   0.0
1377  5.39  4.6   2.25
1378  3.16  5.575  0.0
1379  3.16  5.575  2.25
1380  4.3   4.057  0.0
1381  4.3   4.057  2.25
1382  1.93  4.61  0.0
1383  1.93  4.61  2.25
1384  3.31  3.33  0.0
1385  3.31  3.33  2.25
1386  0.77  3.03  0.0
1387  0.77  3.03  2.25
1388  2.53  2.356  0.0
1389  2.53  2.356  2.25
1390  0.17  1.55  0.0
1391  0.17  1.55  2.25
1392  2.046 1.22  0.0
1393  2.046 1.22  2.25
1394  0.0   0.0   0.0
1395  0.0   0.0   2.25

```

1396	1.87	0.0	0.0
1397	1.87	0.0	2.25
1398	8.27	5.22	0.0
1399	8.27	5.22	2.25
1400	8.065	4.945	0.0
1401	8.065	4.945	2.25

☆

☆☆☆ THE MESH FOR THE REST OF THE HEADER IS GENERATED

☆

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GVOLUME 1238 1230 1231 1239 1366 1367 1399 1398 EL1=2 EL2=4 EL3=1
GVOLUME 1239 1231 1232 1240 1398 1399 1401 1400 EL1=2 EL2=1 EL3=1
GVOLUME 1240 1232 1233 1241 1400 1401 1369 1368 EL1=2 EL2=1 EL3=1
GVOLUME 1367 1366 1370 1371 1369 1368 1372 1373 EL1=2 EL2=1 EL3=6
GVOLUME 1371 1370 1374 1375 1373 1372 1376 1377 EL1=2 EL2=1 EL3=6
GVOLUME 1375 1374 1378 1379 1377 1376 1380 1381 EL1=2 EL2=1 EL3=6
GVOLUME 1379 1378 1382 1383 1381 1380 1384 1385 EL1=2 EL2=1 EL3=6
GVOLUME 1383 1382 1386 1387 1385 1384 1388 1389 EL1=2 EL2=1 EL3=6
GVOLUME 1387 1386 1390 1391 1389 1388 1392 1393 EL1=2 EL2=1 EL3=6
GVOLUME 1391 1390 1394 1395 1393 1392 1396 1397 EL1=2 EL2=1 EL3=6

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☆

☆☆☆ THE BOUNDARY CONDITIONS FOR THE HEADER ARE DEFINED

☆

☆

☆☆☆☆ WHEN USING ADINA-T, COMMENT OUT LINES 526:586

☆

☆☆☆ THE NODES AT THE CENTER OF THE TUBES ARE FIXED

☆

BOUNDARIES 111111 TYPE=NODES/949 STEP 1 TO 956

☆

☆☆ THE NODE AT THE ORIGIN IS FIXED

☆

BOUNDARIES 111111 TYPE=NODES/1892,1891,1893,1394,1395

☆

☆☆ THE NODES ABOVE THE ORIGIN ARE ONLY ALLOWED TO ROLL IN THE X-DIRECTION

☆

BOUNDARIES 011111 TYPE=NODES

932 1015 1018 1023 1026 1031 1034 1039 931 1043 930 1046 929
1895 1902 1906 1913 1917 1924 1928 1935 1939 1946 1950 1956

☆

☆☆ THE NODES IN THE Y=0 PLANE ARE CONSTRAINED TO ROLL ONLY IN THAT PLANE

☆

BOUNDARIES 010111 TYPE=NODES

936 1013 1049 928 961 1051 966 1017 1053 1054 973 1059 978 1025 1061 1062
985 1067 990 1033 1069 1070 997 1075 935 1041 1077 927 1004 1079 934 1044
1080 926 1009 1082 933 1047 1083 925 1394 1395 1891 1893 1894 1896 1900
1901 1903 1904 1905 1907 1911 1912 1914 1915 1916 1918 1922 1923 1925 1926
1927 1929 1933 1934 1936 1937 1938 1940 1944 1945 1947 1948 1949 1951 1956
1397 1955 1957

☆

☆☆ THE NODES IN THE Z=0 PLANE ARE CONSTRAINED TO ROLL ONLY IN THAT PLANE

☆

BOUNDARIES 001111 TYPE=NODES

1	2	3	4	5	6	7	8	9	10	11	17	28
39	50	61	72	83	94	105	116	127	133	136	139	142
145	148	151	157	163	166	169	175	181	184	187	190	193
199	205	208	211	217	223	226	229	232	235	241	247	250

253	259	265	268	271	274	277	280	283	286	289	292	29
301	307	310	313	319	325	328	331	334	337	343	349	35
355	361	367	370	373	376	379	385	391	394	397	403	40
412	415	418	421	424	427	430	433	436	439	442	445	44
451	454	457	460	463	464	465	466	467	468	469	470	47
472	473	479	490	501	512	523	534	545	556	567	578	58
595	598	601	604	607	610	613	619	625	628	631	637	64
646	649	652	655	661	667	670	673	679	685	688	691	69
697	703	709	712	715	721	727	730	733	736	739	742	7
748	751	754	757	763	769	772	775	781	787	790	793	79
799	805	811	814	817	823	829	832	835	838	841	847	85
856	859	865	871	874	877	880	883	886	889	892	895	89
901	904	907	910	913	916	919	922	941	942	943	944	101
1016	1020	1022	1024	1028	1030	1032	1036	1038	1040	1042	1045	104
1055	1063	1071	1122	1123	1124	1126	1128	1130	1131	1132	1134	113
1138	1139	1140	1142	1144	1146	1147	1148	1150	1151	1153	1154	115
1159	1163	1167	1174	1176	1179	1182	1184	1187	1190	1192	1195	119
1200	1202	1204	1206	1210	1216	1222	1234	1235	1236	1237	1279	128
1281	1283	1285	1287	1288	1289	1291	1293	1295	1296	1297	1299	130
1303	1304	1305	1307	1308	1310	1311	1313	1320	1328	1336	1403	140
1409	1412	1415	1418	1421	1425	1429	1433	1437	1441	1445	1448	145
1454	1457	1460	1463	1466	1469	1472	1475	1478	1482	1486	1489	149
1497	1500	1504	1508	1511	1515	1519	1522	1526	1530	1533	1536	153
1542	1545	1548	1552	1556	1559	1563	1567	1570	1574	1578	1581	158
1589	1592	1596	1600	1603	1606	1609	1612	1615	1618	1622	1626	162
1633	1637	1640	1644	1648	1651	1655	1659	1662	1666	1670	1673	167
1679	1682	1685	1688	1692	1696	1699	1703	1707	1710	1714	1718	172
1725	1729	1732	1736	1740	1743	1746	1749	1752	1755	1758	1762	176
1769	1773	1777	1780	1784	1788	1791	1795	1799	1802	1806	1810	181
1816	1819	1822	1825	1828	1832	1836	1839	1843	1847	1850	1854	185
1861	1865	1869	1872	1876	1880	1883	1886	1889	1898	1909	1920	193
1942	1953											

☆

☆☆

☆☆☆ THE INTERNAL PRESSURE LOAD IS APPLIED

☆☆

☆☆☆☆ WHEN USING ADINA-T, COMMENT OUT LINES 593:613

☆☆

LOADS ELEMENT

1 -2 700

STEP 1 TO

120 -2 700

55 -3 700

STEP 1 TO

60 -3 700

115 -3 700

STEP 1 TO

120 -3 700

126 -3 700

STEP 6 TO

192 -3 700

203 -2 700

204 -2 700

215 -3 700

STEP 12 TO

267 -3 700

216 -3 700
STEP 12 TO
288 -3 700

★

***** THERMAL LOAD
★ COMMENT LINES 617:620
***** INITIAL TEMPERATURES

***** 1 350.0

***** STEP 1 TO

***** 1957 350.0

***** WHEN USING ADINA, COMMENT OUT LINES 623:849

★

***** LOADS TEMPERATURE

★

***** INNER NODES OF THE HEADER

★

***** LOW TEMPERATURE SIDE OF MODEL (Z=0.0)

★

***** 1 1 2

***** STEP 1 TO

***** 925 1 2

***** 937 1 1

***** 1119 1 1

***** 1241 1 1

***** 1276 1 1

***** 1368 1 1

***** STEP 4 TO

***** 1396 1 1

***** 1459 1 1

***** 1534 1 1

***** STEP 70 TO

***** 1954 1 1

★

***** 926 1 3

***** 938 1 3

***** 1116 1 3

***** 1240 1 3

***** 1273 1 3

***** 1400 1 3

***** 1450 1 3

***** 1528 1 3

***** STEP 70 TO

***** 1948 1 3

***** 1523 1 3

***** STEP 70 TO

***** 1943 1 3

★

***** 927 1 4

***** 939 1 4

***** 1113 1 4

***** 1239 1 4

***** 1270 1 4

***** 1398 1 4

***** 1414 1 4

***** 1512 1 4

***** STEP 70 TO

```

**** 1932 1 4
**** 1517 1 4
**** STEP 70 TO
**** 1937 1 4
*
**** 1070 1 5
**** 1105 1 5
**** 1106 1 5
**** 1262 1 5
**** 1263 1 5
**** 1411 1 5
**** 1439 1 5
**** 1501 1 5
**** STEP 70 TO
**** 1921 1 5
**** 1506 1 5
**** STEP 70 TO
**** 1926 1 5
*
**** 1062 1 6
**** 1097 1 6
**** 1098 1 6
**** 1254 1 6
**** 1255 1 6
**** 1408 1 6
**** 1431 1 6
**** 1490 1 6
**** STEP 70 TO
**** 1910 1 6
**** 1495 1 6
**** STEP 70 TO
**** 1915 1 6
*
**** 1054 1 7
**** 1089 1 7
**** 1090 1 7
**** 1246 1 7
**** 1405 1 7
**** 1423 1 7
**** 1479 1 7
**** STEP 70 TO
**** 1899 1 7
**** 1484 1 7
**** STEP 70 TO
**** 1904 1 7
*
**** 928 1 8
**** 940 1 8
**** 1085 1 8
**** 1238 1 8
**** 1242 1 8
**** 1366 1 8
**** STEP 4 TO
**** 1394 1 8
**** 1402 1 8
**** 1470 1 8

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*** STEP 70 TO
*** 1890 1 8
*
*** HIGH TEMPERATURE SIDE OF THE MODEL (Z=2.25)
*
*** 933 1 2
*** 945 1 2
*** 1010 1 2
*** 1233 1 2
*** 1365 1 2
*** STEP 4 TO
*** 1397 1 2
*** 1461 1 2
*** 1532 1 2
*** STEP 70 TO
*** 1952 1 2
*
*** 934 1 9
*** 946 1 9
*** 1005 1 9
*** 1232 1 9
*** 1364 1 9
*** 1401 1 9
*** 1452 1 9
*** 1521 1 9
*** STEP 70 TO
*** 1941 1 9
*** 1524 1 9
*** STEP 70 TO
*** 1944 1 9
*
*** 935 1 10
*** 947 1 10
*** 1000 1 10
*** 1231 1 10
*** 1363 1 10
*** 1399 1 10
*** 1416 1 10
*** 1510 1 10
*** STEP 70 TO
*** 1930 1 10
*** 1513 1 10
*** STEP 70 TO
*** 1933 1 10
*
*** 988 1 11
*** 989 1 11
*** 990 1 11
*** 1335 1 11
*** 1359 1 11
*** 1413 1 11
*** 1443 1 11
*** 1499 1 11
*** STEP 70 TO
*** 1919 1 11
*** 1502 1 11

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**** STEP 70 TO
**** 1922 1 11
*
**** 976 1 12
**** 977 1 12
**** 978 1 12
**** 1327 1 12
**** 1355 1 12
**** 1410 1 12
**** 1435 1 12
**** 1488 1 12
**** STEP 70 TO
**** 1908 1 12
**** 1491 1 12
**** STEP 70 TO
**** 1911 1 12
*
**** 964 1 13
**** 965 1 13
**** 966 1 13
**** 1319 1 13
**** 1351 1 13
**** 1407 1 13
**** 1421 1 13
**** 1477 1 13
**** STEP 70 TO
**** 1897 1 13
**** 1480 1 13
**** STEP 70 TO
**** 1900 1 13
*
**** 936 1 14
**** 948 1 14
**** 957 1 14
**** 1230 1 14
**** 1350 1 14
**** 1367 1 14
**** STEP 4 TO
**** 1395 1 14
**** 1404 1 14
**** 1468 1 14
**** STEP 70 TO
**** 1888 1 14
*
** THE MIDNODES OF THE INNER PART OF THE HEADER
*
**** 929 1 15
**** 941 1 15
**** 1237 1 15
**** 1466 1 15
**** 1536 1 15
**** 1606 1 15
**** 1676 1 15
**** 1746 1 15
**** 1816 1 15
**** 1886 1 15

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**** 1956 1 15

*

** THE MIDNODES OF THE OUTER PART OF THE HEADER

*

**** 932 1 16

**** 944 1 16

**** 1234 1 16

**** 1418 1 16

**** 1472 1 16

**** 1542 1 16

**** 1612 1 16

**** 1682 1 16

**** 1752 1 16

**** 1822 1 16

**** 1892 1 16

*

**** THE FOLLOWING CONSTRAINTS ARE NECESSARY BECAUSE COORDINATES
**** WERE DUPLICATED IN THE GENERATION OF THE MESH FOR THE HEADER
**** AT THE BOUNDARY OF THE TUBES

*

**** WHEN USING ADINA-T, COMMENT OUT LINES 856:1325

*

CONSTRAINTS

*

968 1 1019 1

968 2 1019 2

968 3 1019 3

1020 1 1055 1

1020 2 1055 2

1056 1 1091 1

1056 2 1091 2

1956 3 1091 3

1127 1 1092 1

1127 2 1092 2

1127 3 1092 3

1159 1 1128 1

1159 2 1128 2

967 1 1160 1

967 2 1160 2

967 3 1160 3

**** 980 1 1027 1

980 2 1027 2

980 3 1027 3

1028 1 1063 1

1028 2 1063 2

1064 1 1099 1

1064 2 1099 2

1064 3 1099 3

1135 1 1100 1

1135 2 1100 2

1135 3 1100 3

1163 1 1136 1

1163 2 1136 2

979 1 1164 1

979 2 1164 2

979 3 1164 3

992 1 1035 1
 992 2 1035 2
 992 3 1035 3
 1036 1 1071 1
 1036 2 1071 2
 1072 1 1107 1
 1072 2 1107 2
 1072 3 1107 3
 1143 1 1108 1
 1143 2 1108 2
 1143 3 1108 3
 1167 1 1144 1
 1167 2 1144 2
 991 1 1168 1
 991 2 1168 2
 991 3 1168 3
 1158 2 1177 1
 1158 2 1177 2
 1158 3 1177 3
 1179 1 1210 1
 1179 2 1210 2
 1125 1 1209 1
 1125 2 1209 2
 1125 3 1209 3
 1211 1 1248 1
 1211 2 1248 2
 1211 3 1248 3
 1284 1 1249 1
 1284 2 1249 2
 1284 3 1249 3
 1320 1 1285 2
 1320 2 1285 2
 1352 1 1321 1
 1352 2 1321 2
 1352 3 1321 3
 1178 1 1353 1
 1178 2 1353 2
 1178 3 1353 3
 1162 1 1185 1
 1162 2 1185 2
 1162 3 1185 3
 1187 1 1216 1
 1187 2 1216 1
 1133 1 1215 1
 1133 2 1215 2
 1133 3 1215 3
 1217 1 1256 1
 1217 2 1256 2
 1217 3 1256 3
 1292 1 1257 1
 1292 2 1257 2
 1292 3 1257 3
 1328 1 1293 1
 1328 2 1293 2
 1356 1 1329 1
 1356 2 1329 2

1356 3 1329 3
 1186 1 1357 1
 1186 2 1357 2
 1186 3 1357 3
 1166 1 1193 1
 1166 2 1193 2
 1166 3 1193 3
 1195 1 1222 1
 1195 2 1222 2
 1141 1 1221 1
 1141 2 1221 2
 1141 3 1221 3
 1223 1 1264 1
 1223 2 1264 2
 1223 3 1264 3
 1300 1 1265 1
 1300 2 1265 2
 1300 3 1265 3
 1336 1 1301 1
 1336 2 1301 2
 1360 1 1337 1
 1360 2 1337 2
 1360 3 1337 3
 1194 1 1361 1
 1194 2 1361 2
 1194 3 1361 3

☆

☆☆

☆☆ THE FOLLOWING CONSTRAINTS DEFINE THE CONTACT SURFACES

☆☆

283 2 1124 2
 284 2 962 2
 284 3 962 3
 285 2 963 2
 285 3 963 3
 286 2 1016 2
 287 2 1052 2
 287 3 1052 3
 288 2 1088 2
 288 3 1088 3
 325 2 1132 2
 326 2 974 2
 326 3 974 3
 327 2 975 2
 327 3 975 3
 328 2 1024 2
 329 2 1060 2
 329 3 1060 3
 330 2 1096 2
 330 3 1096 3
 367 2 1140 2
 368 2 986 2
 368 3 986 3
 369 2 987 2
 369 3 987 3
 370 2 1032 2

371 2 1068 2
 371 3 1068 3
 372 2 1104 2
 372 3 1104 3
 409 2 1148 2
 410 2 998 2
 410 3 998 3
 411 2 999 2
 411 3 999 3
 412 2 1040 2
 413 2 1076 2
 413 3 1076 3
 414 2 1112 2
 414 3 1112 3
 745 2 1281 2
 746 2 1317 2
 746 3 1317 3
 747 2 1175 2
 747 3 1175 3
 748 2 1176 2
 749 2 1208 2
 749 3 1208 3
 750 2 1245 2
 750 3 1245 3
 787 2 1289 2
 788 2 1325 2
 788 3 1325 3
 789 2 1183 2
 789 3 1183 3
 790 2 1184 2
 791 2 1214 2
 791 3 1214 3
 792 2 1253 2
 792 3 1253 3
 829 2 1297 2
 830 2 1333 2
 830 3 1333 3
 831 2 1191 2
 831 3 1191 3
 832 2 1192 2
 833 2 1220 2
 833 3 1220 3
 834 2 1261 2
 834 3 1261 3
 871 2 1305 2
 872 2 1341 2
 872 3 1341 3
 873 2 1199 2
 873 3 1199 3
 874 2 1200 2
 875 2 1226 2
 875 3 1226 3
 876 2 1269 2
 876 3 1269 3

☆
 ☆

*** THESE ARE THE CONTACT SURFACES FOR THE 3-DIMENSIONAL MODEL

*

CGROUP 1 CONTACT3

*

*** CONTACTSURFACE 1 IS THE HEADER AROUND THE INNER TUBE

*

CONTACTSURFACE 1

*

1	123	124	970	969
2	969	970	982	981
3	981	982	994	993
4	993	994	69	68
5	124	125	971	970
6	970	971	983	982
7	982	983	995	994
8	994	995	70	69
9	125	126	1021	971
10	971	1021	1029	983
11	983	1029	1037	995
12	995	1037	71	70
13	126	127	1022	1021
14	1021	1022	1030	1029
15	1029	1030	1038	1037
16	1037	1038	72	71
17	127	128	1057	1022
18	1022	1057	1065	1030
19	1030	1065	1073	1038
20	1038	1073	73	72
21	128	129	1058	1057
22	1057	1058	1066	1065
23	1065	1066	1074	1073
24	1073	1074	74	73
25	129	130	1093	1058
26	1058	1093	1101	1066
27	1066	1101	1109	1074
28	1074	1109	75	74
29	130	131	1094	1093
30	1093	1094	1102	1101
31	1101	1102	1110	1109
32	1109	1110	76	75
33	131	132	1129	1094
34	1094	1129	1137	1102
35	1102	1137	1145	1110
36	1110	1145	77	76
37	132	11	1130	1129
38	1129	1130	1138	1137
39	1137	1138	1146	1145
40	1145	1146	6	77
41	11	122	1161	1130
42	1130	1161	1165	1138
43	1138	1165	1169	1146
44	1146	1169	67	6
45	122	123	969	1161
46	1161	969	981	1165
47	1165	981	993	1169

48 1169 993 68 67

☆

☆☆

CONTACTSURFACE 2 IS THE HEADER AROUND THE OUTER TUBE

☆

CONTACTSURFACE 2

☆

1	585	586	1354	1323
2	1323	1354	1358	1331
3	1331	1358	1362	1339
4	1339	1362	531	530
5	586	587	1180	1354
6	1354	1180	1188	1358
7	1358	1188	1196	1362
8	1362	1196	532	531
9	587	588	1181	1180
10	1180	1181	1189	1188
11	1188	1189	1197	1196
12	1196	1197	533	532
13	588	589	1182	1181
14	1181	1182	1190	1189
15	1189	1190	1198	1197
16	1197	1198	534	533
17	589	590	1212	1182
18	1182	1212	1218	1190
19	1190	1218	1224	1198
20	1198	1224	535	534
21	590	591	1213	1212
22	1212	1213	1219	1218
23	1218	1219	1225	1224
24	1224	1225	536	535
25	591	592	1250	1213
26	1213	1250	1258	1219
27	1219	1258	1266	1225
28	1225	1266	537	536
29	592	593	1251	1250
30	1250	1251	1259	1258
31	1258	1259	1267	1266
32	1266	1267	538	537
33	593	594	1286	1251
34	1251	1286	1294	1259
35	1259	1294	1302	1267
36	1267	1302	539	538
37	594	473	1287	1286
38	1286	1287	1295	1294
39	1294	1295	1303	1302
40	1302	1303	468	539
41	473	584	1322	1287
42	1287	1322	1330	1295
43	1295	1330	1338	1303
44	1303	1338	529	468
45	584	585	1323	1322
46	1322	1323	1331	1330
47	1330	1331	1339	1338
48	1338	1339	530	529

☆☆

*** CONTACTSURFACE 3 IS THE INNER TUBE

**

CONTACTSURFACE 3

**

1	195	237	238	196
2	237	90	91	238
3	90	297	298	91
4	297	339	340	298
5	339	381	382	340
6	381	68	69	382
7	196	238	239	197
8	238	91	92	239
9	91	298	299	92
10	298	340	341	299
11	340	382	383	341
12	382	69	70	383
13	197	239	240	198
14	239	92	93	240
15	92	299	300	93
16	299	341	342	300
17	341	383	384	342
18	383	70	71	384
19	198	240	241	199
20	240	93	94	241
21	93	300	301	94
22	300	342	343	301
23	342	384	385	343
24	384	71	72	385
25	199	241	242	200
26	241	94	95	242
27	94	301	302	95
28	301	343	344	302
29	343	385	386	344
30	385	72	73	386
31	200	242	243	201
32	242	95	96	243
33	95	302	303	96
34	302	344	345	303
35	344	386	387	345
36	386	73	74	387
37	201	243	244	202
38	243	96	97	244
39	96	303	304	97
40	303	345	346	304
41	345	387	388	346
42	387	74	75	388
43	202	244	245	203
44	244	97	98	245
45	97	304	305	98
46	304	346	347	305
47	346	388	389	347
48	388	75	76	389
49	203	245	246	204
50	245	98	99	246
51	98	305	306	99
52	305	347	348	306

53	347	389	390	348
54	389	76	77	390
55	204	246	235	193
56	246	99	8	235
57	99	306	295	8
58	306	348	337	295
59	348	390	379	337
60	390	77	6	379
61	193	235	236	194
62	235	8	89	236
63	8	295	296	89
64	295	337	338	296
65	337	379	380	338
66	379	6	67	380
67	194	236	237	195
68	236	89	90	237
69	89	296	297	90
70	296	338	339	297
71	338	380	381	339
72	380	67	68	381

✱

✱✱ CONTACTSURFACE 4 IS THE OUTER TUBE

✱

CONTACTSURFACE 4

✱

1	657	699	700	658
2	699	552	553	700
3	552	759	760	553
4	759	801	802	760
5	801	843	844	802
6	843	530	531	844
7	658	700	701	659
8	700	553	554	701
9	553	760	761	554
10	760	802	803	761
11	802	844	845	803
12	844	531	532	845
13	659	701	702	660
14	701	554	555	702
15	554	761	762	555
16	761	803	804	762
17	803	845	846	804
18	845	532	533	846
19	660	702	703	661
20	702	555	556	703
21	555	762	763	556
22	762	804	805	763
23	804	846	847	805
24	846	533	534	847
25	661	703	704	662
26	703	556	557	704
27	556	763	764	557
28	763	805	806	764
29	805	847	848	806
30	847	534	535	848
31	662	704	705	663

32	704	557	558	705
33	557	764	765	558
34	764	806	807	765
35	806	848	849	807
36	848	535	536	849
37	663	705	706	664
38	705	558	559	706
39	558	765	766	559
40	765	807	808	766
41	807	849	850	808
42	849	536	537	850
43	664	706	707	665
44	706	559	560	707
45	559	766	767	560
46	766	808	809	767
47	808	850	851	809
48	850	537	538	851
49	665	707	708	666
50	707	560	561	708
51	560	767	768	561
52	767	809	810	768
53	809	851	852	810
54	851	538	539	852
55	666	708	697	655
56	708	561	470	697
57	561	768	757	470
58	768	810	799	757
59	810	852	841	799
60	852	539	468	841
61	655	697	698	656
62	697	470	551	698
63	470	757	758	551
64	757	799	800	758
65	799	841	842	800
66	841	468	529	842
67	656	698	699	657
68	698	551	552	699
69	551	758	759	552
70	758	800	801	759
71	800	842	843	801
72	842	529	530	843

**

*** THE FOLLOWING DEFINE THE CONTACT PAIRS FOR THE TUBE TO HEADER INTERFACE

**

```
CONTACTPAIR 1  C=1 T=3
CONTACTPAIR 2  C=2 T=4
```

**

**

*** THE FOLLOWING DEFINE THE GRAPHICS FOR THE HEADER

**

```
*****  FRAME  XFMAX= 22.5  YFMAX= 17.0  XSF= 1.0  YSF= 0.5
*****  VIEW  ID=1  XVIEW=1  YVIEW=-1  ZVIEW=1
*****  VIEW  ID=1  XVIEW=0  YVIEW=0  ZVIEW=1
```

**

*** THE FOLLOWING ZONES DEFINE DIFFERENT PARTS OF THE HEADER

**

```

**** INNER TUBE
**** EZONE TUBE1
**** 1 2 STEP 1 TO 60
***** MESH TUBE1 VIEW=1 PLOTAREA=0
*
**** OUTER TUBE
**** EZONE TUBE2
**** 61 62 STEP 1 TO 120
***** MESH TUBE2 VIEW=1 PLOTAREA=0
*
**** INNER TUBE HEADER
**** EZONE IHDR
**** 121 122 STEP 1 TO 156
***** MESH IHDR VIEW=1 PLOTAREA=0
*
*
**** OUTER TUBE HEADER
**** EZONE OHDR
**** 157 158 STEP 1 TO 192
***** MESH OHDR VIEW=1 PLOTAREA=0
*
*
**** INNER TUBE AND INNER TUBE HEADER
**** ZZONE COMBO1 TUBE1 IHDR
***** MESH COMBO1 VIEW=1 PLOTAREA=0
*
**** OUTER TUBE AND OUTER TUBE HEADER
**** ZZONE COMBO2 TUBE2 OHDR
***** MESH COMBO2 VIEW=1 PLOTAREA=0
*
*
**** REST OF THE HEADER
**** EZONE HDR
**** 193 194 STEP 1 TO 288
***** MESH HDR VIEW=1 PLOTAREA=0
*
***** ENTIRE HEADER
***** ZZONE COMBO3 COMBO1 COMBO2 HDR
***** MESH COMBO3 VIEW=1 PLOTAREA=0 HIDDEN=REMOVE OUTLINE=YES LINES=-99
*
***** ADINA-T
ADINA
*
*
****
*
END

```

APPENDIX B. ADINA PLOT FILE: PROGRAM SUPHTRTEMP.PLOT

```
*****      --- ADINA-PLOT INPUT FILE ---
*
*
***** THIS FILE IS THE RESULTS OF THE ANALYSIS FOR THE LHA-1 CLASS
* SUPERHEATER HEADER
*
*
***** CONTROL PARAMETERS
*
FILEUNITS LIST=7 LOG=6 ECHO=6
CONTROL ORIGIN=UPPERLEFT
*
WORKSTATION SYSTEM=4 DEVICE=0 OPTION=0
*
*
***** ADINA-PLOT CONTROL PARAMETERS
*
DATABASE CREATE FORMATTED=YES
*
*
***** DEFINE STRESS POINTS OF THE WELD
*
EZONE TUBE1
55 56 STEP 1 TO 60
115 116 STEP 1 TO 120
*
***** GRAPHICS PORTION
***** ORIGINAL MESH VS. DEFORMED MESH
*
***** VIEW ID=1 XVIEW=0 YVIEW=0 ZVIEW=-1
*
***** FRAME HEADING=UPPER XFMAX=22.5 YFMAX=17.0 XSF=1.0 YSF=0.5
***** MESH PLOTAREA=0 VIEW=1 ORIGINAL=1 DEFORMED=2 DMAX=1.0,
***** HIDDEN=N LINES=-99
*
*
***** TABLES AND LISTS OF RESULTS
*
ZLIST TUBE1 VARIABLES=STRESS-XX STRESS-YY STRESS-ZZ STRESS-XY,
STRESS-XZ STRESS-YZ
*
*
END
```

APPENDIX C. ADINA-IN INPUT FILE: PROGRAM SUPHTR.IN

```

*
*   -- ADINA INPUT FILE FOR 3D-HEADER --
*
* THIS PROGRAM IS THE MODEL FOR THE LHA-1 SUPERHEATER HEADER
*
* CONTROL INFORMATION
*
* FILEUNITS LIST=6 LOG=6 ECHO=6
* CONTROL ORIGIN=UPPERLEFT
*
* DATABASE CREATE
*
* *** ADINA CONTROL INFORMATION
*
* HEADING '3D-SUPERHEATER HEADER'
*
* *** MASTER DEGREES OF FREEDOM ARE DEFINED
*
* MASTER REACTIONS=YES IDOF=000111
* ANALYSIS TYPE=STATIC
* PRINTOUT IV=0 IA=0
* PORTHOLE FO=YES
*
* WORKSTATION SYSTEM=4 DEVICE=0 OPTION=1
*
* *** THE MATERIAL PROPERTIES ARE DEFINED
*
* MATERIAL N=1 ELASTIC E=29600000 NU=0.3
*
* *** THE COORDINATES FOR THE ENTIRE HEADER ARE DEFINED
*
* SUBSTRUCTURE 0
* SYSTEM 0
* COORDINATES/ENTRIES

```

NODE	X	Y	Z
1	0.0	0.0	0.0
2	11.4	0.0	0.0
3	0.0	0.0	2.25
4	11.4	0.0	2.25

```

*
* *** THE ELEMENT IS DEFINED
*
* SUBSTRUCTURE 1
* EGROUP 1 THREEDSOLID

```

```

STRESSTABLE 1 1 2 3 4 5 6 7 8 21
EDATA/ENTRIES EL TABLE PRINT
                1 1 YES
                STEP 1 TO
                288 1 YES

```

*
 *

*** THE COORDINATES FOR THE INNER TUBE ARE DEFINED

*

```

SYSTEM 1 TYPE=CYLINDRICAL X=9.4 Y=1.0 Z=1.125
COORDINATES/ENTRIES NODE R THETA XL
                1 0.63 0 0.0
                2 0.75 0 0.0
                3 0.63 0 0.156
                4 0.75 0 0.156
                5 0.63 0 0.218
                6 0.75 0 0.218
                7 0.63 0 2.0
                8 0.75 0 2.0
                9 0.63 0 4.0
                10 0.75 0 4.0
                11 0.75001 0 2.0

```

```

LINE CYLINDRICAL 1 1 6 1
LINE CYLINDRICAL 2 2 6 1
LINE CYLINDRICAL 3 3 6 1
LINE CYLINDRICAL 4 4 6 1
LINE CYLINDRICAL 5 5 6 1
LINE CYLINDRICAL 6 6 6 1
LINE CYLINDRICAL 7 7 6 1
LINE CYLINDRICAL 8 8 6 1
LINE CYLINDRICAL 9 9 6 1
LINE CYLINDRICAL 10 10 6 1
LINE CYLINDRICAL 11 11 6 1

```

*
 *

*** THE MESH FOR THE INNER TUBE IS GENERATED

*

```

GVOLUME 10 10 9 9 8 8 7 7 EL1=6 EL2=1 EL3=4 NO=20
GVOLUME 8 8 7 7 6 6 5 5 EL1=6 EL2=1 EL3=4 NO=20
GVOLUME 6 6 5 5 4 4 3 3 EL1=6 EL2=1 EL3=1 NO=20
GVOLUME 4 4 3 3 2 2 1 1 EL1=6 EL2=1 EL3=1 NO=20

```

*
 *

*** THE COORDINATES FOR THE OUTER TUBE ARE DEFINED

*

```

SYSTEM 2 TYPE=CYLINDRICAL X=9.4 Y=3.0 Z=1.125
COORDINATES/ENTRIES NODE R THETA XL
                463 0.63 0 -0.4564
                464 0.75 0 -0.49
                465 0.63 0 -0.09327705
                466 0.75 0 -0.11162873
                479 0.63 180 -0.1036
                490 0.75 180 -0.07
                467 0.63 0 0.218
                468 0.75 0 0.218
                469 0.63 0 1.64381482

```

470	0.75	0	1.61759259
471	0.63	0	4.0
472	0.75	0	4.0
473	0.75001	0	1.61759041
589	0.75001	180	1.94537256
474	0.63	30	-0.43276688
475	0.63	60	-0.3682
476	0.63	90	-0.28
477	0.63	120	-0.1918
478	0.63	150	-0.12723312
480	0.63	210	-0.12723312
481	0.63	240	-0.1918
482	0.63	270	-0.28
483	0.63	300	-0.3682
484	0.63	330	-0.43276688
485	0.75	30	-0.46186535
486	0.75	60	-0.385
487	0.75	90	-0.28
488	0.75	120	-0.175
489	0.75	150	-0.09813465
491	0.75	210	-0.09813465
492	0.75	240	-0.175
493	0.75	270	-0.28
494	0.75	300	-0.385
495	0.75	330	-0.46186535
584	0.75001	30	1.63954765
585	0.75001	60	1.69953594
586	0.75001	90	1.78148148
587	0.75001	120	1.86342702
588	0.75001	150	1.92341531
590	0.75001	210	1.92341531
591	0.75001	240	1.86342702
592	0.75001	270	1.78148148
593	0.75001	300	1.69953594
594	0.75001	330	1.63954765
496	0.63	30	-0.08036908
497	0.63	60	-0.04510387
498	0.63	90	0.0030693
499	0.63	120	0.05124247
500	0.63	150	0.08650768
501	0.63	180	0.09941564
502	0.63	210	0.08650768
503	0.63	240	0.05124247
504	0.63	270	0.0030693
505	0.63	300	-0.04510387
506	0.63	330	-0.08036908
507	0.75	30	-0.09626212
508	0.75	60	-0.05427972
509	0.75	90	0.0030693
510	0.75	120	0.06041831
511	0.75	150	0.10240071
512	0.75	180	0.11776732
513	0.75	210	0.10240071
514	0.75	240	0.06041831
515	0.75	270	0.0030693
516	0.75	300	-0.05427972

517	0.75	330	-0.09626212
540	0.63	30	1.66225867
541	0.63	60	1.71264813
542	0.63	90	1.78148148
543	0.63	120	1.85031484
544	0.63	150	1.9007043
545	0.63	180	1.91914817
546	0.63	210	1.9007043
547	0.63	240	1.85031484
548	0.63	270	1.78148148
549	0.63	300	1.71264813
550	0.63	330	1.66225867
551	0.75	30	1.63954951
552	0.75	60	1.69953704
553	0.75	90	1.78148148
554	0.75	120	1.86342593
555	0.75	150	1.92341346
556	0.75	180	1.94537037
557	0.75	210	1.92341346
558	0.75	240	1.86342593
559	0.75	270	1.78148148
560	0.75	300	1.69953704
561	0.75	330	1.63954951

☆

```

LINE NODES 463 463 474 475
              476 STEP 1 TO 484
LINE NODES 464 464 485 486
              487 STEP 1 TO 495
LINE NODES 465 465 496 497
              498 STEP 1 TO 506
LINE NODES 466 466 507 508
              509 STEP 1 TO 517
LINE CYLINDRICAL 467 467 6 1
LINE CYLINDRICAL 468 468 6 1
LINE NODES 469 469 540 541
              542 STEP 1 TO 550
LINE NODES 470 470 551 552
              553 STEP 1 TO 561
LINE CYLINDRICAL 471 471 6 1
LINE CYLINDRICAL 472 472 6 1
LINE NODES 473 473 584 585
              586 STEP 1 TO 594

```

☆

☆

☆☆☆ THE MESH FOR THE OUTER TUBE IS GENERATED

☆

```

GVOLUME 472 472 471 471 470 470 469 469 EL1=6 EL2=1 EL3=4 NO=20
GVOLUME 470 470 469 469 468 468 467 467 EL1=6 EL2=1 EL3=4 NO=20
GVOLUME 468 468 467 467 466 466 465 465 EL1=6 EL2=1 EL3=1 NO=20
GVOLUME 466 466 465 465 464 464 463 463 EL1=6 EL2=1 EL3=1 NO=20

```

☆

☆

☆☆☆ THE COORDINATES FOR THE HEADER AROUND THE TUBES ARE DEFINED

☆

```

SYSTEM 3 TYPE=CARTESIAN X=9.4 Y=0 Z=0

```

☆

*** INNER TUBE HEADER NODES

*

COORDINATES/ENTRIES	NODES	X	Y	Z
	925	0.0	0.0	0.0
	926	0.156	0.0	0.0
	927	0.218	0.0	0.0
	928	2.0	0.0	0.0
	929	0.0	0.0	1.125
	930	0.156	0.0	1.125
	931	0.218	0.0	1.125
	932	2.0	0.0	1.125
	933	0.0	0.0	2.25
	934	0.156	0.0	2.25
	935	0.218	0.0	2.25
	936	2.0	0.0	2.25
	937	0.0	2.0	0.0
	938	0.156	2.0	0.0
	939	0.218	2.0	0.0
	940	2.0	2.0	0.0
	941	0.0	2.0	1.125
	942	0.156	2.0	1.125
	943	0.218	2.0	1.125
	944	2.0	2.0	1.125
	945	0.0	2.0	2.25
	946	0.156	2.0	2.25
	947	0.218	2.0	2.25
	948	2.0	2.0	2.25

*

*** NODES OF THE CENTERS OF THE TUBES FOR MESH GENERATION

*

949	0.0	1.0	1.125
950	0.156	1.0	1.125
951	0.218	1.0	1.125
952	2.0	1.0	1.125
953	0.0	3.0	1.125
954	0.156	3.0	1.125
955	0.218	3.0	1.125
956	2.0	3.0	1.125

*

*** NODES FOR THE OUTER TUBE HEADER

*

1230	1.41	4.7	2.25
1231	0.218	4.2764467	2.25
1232	-0.171	4.13822335	2.25
1233	-0.56	4.0	2.25
1234	1.41	4.7	1.125
1235	0.218	4.2764467	1.125
1236	-0.171	4.13822335	1.125
1237	-0.56	4.0	1.125
1238	1.41	4.7	0.0
1239	0.218	4.2764467	0.0
1240	-0.171	4.13822335	0.0
1241	-0.56	4.0	0.0

*

*** GENERATION OF THE MESH FOR THE INNER TUBE HEADER

*

LINE NODES 123 125 124
 LINE ARC 68 70 NCEN=951 EL=1 M=1 NCO=ALL
 LINE ARC 46 48 NCEN=950 EL=1 M=1 NCO=ALL
 LINE ARC 24 26 NCEN=949 EL=1 M=1 NCO=ALL
 GVOLUME 948 936 125 123 947 935 70 68 EL1=1 EL2=1 EL3=4 NC=N
 GVOLUME 947 935 70 68 946 934 48 46 EL1=1 EL2=1 EL3=1 NC=A
 GVOLUME 946 934 48 46 945 933 26 24 EL1=1 EL2=1 EL3=1 NC=A

☆

LINE NODES 125 127 126
 LINE ARC 70 72 NCEN=951 EL=1 M=1 NCO=ALL
 LINE ARC 48 50 NCEN=950 EL=1 M=1 NCO=ALL
 LINE ARC 26 28 NCEN=949 EL=1 M=1 NCO=ALL
 GVOLUME 936 932 127 125 935 931 72 70 EL1=1 EL2=1 EL3=4 NC=N
 GVOLUME 935 931 72 70 934 930 50 48 EL1=1 EL2=1 EL3=1 NC=A
 GVOLUME 934 930 50 48 933 929 28 26 EL1=1 EL2=1 EL3=1 NC=A

☆

LINE NODES 127 129 128
 LINE ARC 72 74 NCEN=951 EL=1 M=1 NCO=ALL
 LINE ARC 50 52 NCEN=950 EL=1 M=1 NCO=ALL
 LINE ARC 28 30 NCEN=949 EL=1 M=1 NCO=ALL
 GVOLUME 932 928 129 127 931 927 74 72 EL1=1 EL2=1 EL3=4 NC=N
 GVOLUME 931 927 74 72 930 926 52 50 EL1=1 EL2=1 EL3=1 NC=A
 GVOLUME 930 926 52 50 929 925 30 28 EL1=1 EL2=1 EL3=1 NC=A

☆

LINE NODES 129 131 130
 LINE ARC 74 76 NCEN=951 EL=1 M=1 NCO=ALL
 LINE ARC 52 54 NCEN=950 EL=1 M=1 NCO=ALL
 LINE ARC 30 32 NCEN=949 EL=1 M=1 NCO=ALL
 GVOLUME 928 940 131 129 927 939 76 74 EL1=1 EL2=1 EL3=4 NC=N
 GVOLUME 927 939 76 74 926 938 54 52 EL1=1 EL2=1 EL3=1 NC=A
 GVOLUME 926 938 54 52 925 937 32 30 EL1=1 EL2=1 EL3=1 NC=A

☆

LINE NODES 131 11 132
 LINE ARC 76 6 NCEN=951 EL=1 M=1 NCO=ALL
 LINE ARC 54 4 NCEN=950 EL=1 M=1 NCO=ALL
 LINE ARC 32 2 NCEN=949 EL=1 M=1 NCO=ALL
 GVOLUME 940 944 11 131 939 943 6 76 EL1=1 EL2=1 EL3=4 NC=N
 GVOLUME 939 943 6 76 938 942 4 54 EL1=1 EL2=1 EL3=1 NC=A
 GVOLUME 938 942 4 54 937 941 2 32 EL1=1 EL2=1 EL3=1 NC=A

☆

LINE NODES 11 123 122
 LINE ARC 6 68 NCEN=951 EL=1 M=1 NCO=ALL
 LINE ARC 4 46 NCEN=950 EL=1 M=1 NCO=ALL
 LINE ARC 2 24 NCEN=949 EL=1 M=1 NCO=ALL
 GVOLUME 944 948 123 11 943 947 68 6 EL1=1 EL2=1 EL3=4 NC=N
 GVOLUME 943 947 68 6 942 946 46 4 EL1=1 EL2=1 EL3=1 NC=A
 GVOLUME 942 946 46 4 941 945 24 2 EL1=1 EL2=1 EL3=1 NC=A

☆

☆☆☆ GENERATION OF THE MESH FOR THE OUTER TUBE HEADER

☆

LINE NODES 587 589 588
 LINE NODES 532 534 533
 LINE NODES 510 512 511
 LINE NODES 488 490 489
 GVOLUME 948 944 589 567 947 943 534 532 EL1=1 EL2=1 EL3=4 NC=N
 LINE NODES 502 510 891

```

GVOLUME 947 943 534 532 946 942 512 510 EL1=1 EL2=1 EL3=1 NC=A
LINE NODES 510 488 909
GVOLUME 946 942 512 510 945 941 490 488 EL1=1 EL2=1 EL3=1 NC=A
*
LINE NODES 589 591 590
LINE NODES 534 536 535
LINE NODES 512 514 513
LINE NODES 490 492 491
GVOLUME 944 940 591 589 943 939 536 534 EL1=1 EL2=1 EL3=4 NC=N
LINE NODES 536 514 893
GVOLUME 943 939 536 534 942 938 514 512 EL1=1 EL2=1 EL3=1 NC=A
LINE NODES 514 492 911
GVOLUME 942 938 514 512 941 937 492 490 EL1=1 EL2=1 EL3=1 NC=A
*
LINE NODES 591 593 592
LINE NODES 536 538 537
LINE NODES 514 516 515
LINE NODES 492 494 493
GVOLUME 940 1238 593 591 939 1239 538 536 EL1=1 EL2=1 EL3=4 NC=N
LINE NODES 538 516 894
GVOLUME 939 1239 538 536 938 1240 516 514 EL1=1 EL2=1 EL3=1 NC=A
LINE NODES 516 494 912
GVOLUME 938 1240 516 514 937 1241 494 492 EL1=1 EL2=1 EL3=1 NC=A
*
LINE NODES 593 473 594
LINE NODES 538 468 539
LINE NODES 516 466 517
LINE NODES 494 464 495
GVOLUME 1238 1234 473 593 1239 1235 468 538 EL1=1 EL2=1 EL3=4 NC=N
GVOLUME 1239 1235 468 538 1240 1236 466 516 EL1=1 EL2=1 EL3=1 NC=A
GVOLUME 1240 1236 466 516 1241 1237 464 494 EL1=1 EL2=1 EL3=1 NC=A
*
LINE NODES 473 585 584
LINE NODES 468 530 529
LINE NODES 466 508 507
LINE NODES 464 486 485
GVOLUME 1234 1230 585 473 1235 1231 530 468 EL1=1 EL2=1 EL3=4 NC=N
LINE NODES 530 508 890
GVOLUME 1235 1231 530 468 1236 1232 508 466 EL1=1 EL2=1 EL3=1 NC=A
LINE NODES 508 486 908
GVOLUME 1236 1232 508 466 1237 1233 486 464 EL1=1 EL2=1 EL3=1 NC=A
*
LINE NODES 585 587 586
LINE NODES 530 532 531
LINE NODES 508 510 509
LINE NODES 486 488 487
GVOLUME 1230 948 587 585 1231 947 532 530 EL1=1 EL2=1 EL3=4 NC=N
GVOLUME 1231 947 532 530 1232 946 510 508 EL1=1 EL2=1 EL3=1 NC=A
GVOLUME 1232 946 510 508 1233 945 488 486 EL1=1 EL2=1 EL3=1 NC=A
*
*
*** THE COORDINATES FOR THE REST OF THE HEADER ARE DEFINED
*
SYSTEM N=0
*
COORDINATES/ENTRIES  NODE      X          Y          Z

```

1366	9.09	6.32	0.0
1367	9.09	6.32	2.25
1368	7.86	4.67	0.0
1369	7.86	4.67	2.25
1370	6.9	6.79	0.0
1371	6.9	6.79	2.25
1372	6.644	4.85	0.0
1373	6.644	4.85	2.25
1374	4.91	6.37	0.0
1375	4.91	6.37	2.25
1376	5.39	4.6	0.0
1377	5.39	4.6	2.25
1378	3.16	5.575	0.0
1379	3.16	5.575	2.25
1380	4.3	4.057	0.0
1381	4.3	4.057	2.25
1382	1.93	4.61	0.0
1383	1.93	4.61	2.25
1384	3.31	3.33	0.0
1385	3.31	3.33	2.25
1386	0.77	3.03	0.0
1387	0.77	3.03	2.25
1388	2.53	2.356	0.0
1389	2.53	2.356	2.25
1390	0.17	1.55	0.0
1391	0.17	1.55	2.25
1392	2.046	1.22	0.0
1393	2.046	1.22	2.25
1394	0.0	0.0	0.0
1395	0.0	0.0	2.25
1396	1.87	0.0	0.0
1397	1.87	0.0	2.25
1398	8.27	5.22	0.0
1399	8.27	5.22	2.25
1400	8.065	4.945	0.0
1401	8.065	4.945	2.25

☆

*** THE MESH FOR THE REST OF THE HEADER IS GENERATED

☆

GVOLUME	1233	1230	1231	1239	1366	1367	1399	1398	EL1=2	EL2=4	EL3=1
GVOLUME	1239	1231	1232	1240	1398	1399	1401	1400	EL1=2	EL2=1	EL3=1
GVOLUME	1240	1232	1233	1241	1400	1401	1369	1368	EL1=2	EL2=1	EL3=1
GVOLUME	1367	1366	1370	1371	1369	1368	1372	1373	EL1=2	EL2=1	EL3=6
GVOLUME	1371	1370	1374	1375	1373	1372	1376	1377	EL1=2	EL2=1	EL3=6
GVOLUME	1375	1374	1378	1379	1377	1376	1380	1381	EL1=2	EL2=1	EL3=6
GVOLUME	1379	1378	1382	1383	1381	1380	1384	1385	EL1=2	EL2=1	EL3=6
GVOLUME	1383	1382	1386	1387	1385	1384	1388	1389	EL1=2	EL2=1	EL3=6
GVOLUME	1387	1386	1390	1391	1389	1388	1392	1393	EL1=2	EL2=1	EL3=6
GVOLUME	1391	1390	1394	1395	1393	1392	1396	1397	EL1=2	EL2=1	EL3=6

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*** THE BOUNDARY CONDITIONS FOR THE HEADER ARE DEFINED

☆

*** THE NODES AT THE CENTER OF THE TUBES ARE FIXED

☆

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BOUNDARIES 111111 TYPE=NODES/949 STEP 1 TO 956
*** THE NODE AT THE ORIGIN IS FIXED
*
BOUNDARIES 111111 TYPE=NODES/1892
*
*** THE NODES ABOVE THE ORIGIN ARE ONLY ALLOWED TO ROLL IN THE X-DIRECTION
*
BOUNDARIES 011111 TYPE=NODES
932 1015 1018 1023 1026 1031 1034 1039 931 1043 930 1046 929
1895 1902 1906 1913 1917 1924 1928 1935 1939 1946 1950 1956
*
*** THE NODES IN THE Y=0 PLANE ARE CONSTRAINED TO ROLL ONLY IN THAT PLANE
*
BOUNDARIES 010111 TYPE=NODES
936 1013 1049 928 961 1051 966 1017 1053 1054 973 1059 978 1025 1061 1062
985 1067 990 1033 1069 1070 997 1075 935 1041 1077 927 1004 1079 934 1044
1080 926 1009 1082 933 1047 1083 925 1394 1395 1891 1893 1894 1896 1900
1901 1903 1904 1905 1907 1911 1912 1914 1915 1916 1918 1922 1923 1925 1926
1927 1929 1933 1934 1936 1937 1938 1940 1944 1945 1947 1948 1949 1951 1396
1397 1955 1957
*
*** THE NODES IN THE Z=0 PLANE ARE CONSTRAINED TO ROLL ONLY IN THAT PLANE
*
BOUNDARIES 001111 TYPE=NODES
1 2 3 4 5 6 7 8 9 10 11 17 21
39 50 61 72 83 94 105 116 127 133 136 139 142
145 148 151 157 163 166 169 175 181 184 187 190 193
199 205 208 211 217 223 226 229 232 235 241 247 250
253 259 265 268 271 274 277 280 283 286 289 292 295
301 307 310 313 319 325 328 331 334 337 343 349 353
355 361 367 370 373 376 379 385 391 394 397 403 406
412 415 418 421 424 427 430 433 436 439 442 445 448
451 454 457 460 463 464 465 466 467 468 469 470 471
472 473 479 490 501 512 523 534 545 556 567 578 589
595 598 601 604 607 610 613 619 625 628 631 637 640
646 649 652 655 661 667 670 673 679 685 688 691 694
697 703 709 712 715 721 727 730 733 736 739 742 745
748 751 754 757 763 769 772 775 781 787 790 793 796
799 805 811 814 817 823 829 832 835 838 841 847 850
856 859 865 871 874 877 880 883 886 889 892 895 898
901 904 907 910 913 916 919 922 941 942 943 944 1014
1016 1020 1022 1024 1028 1030 1032 1036 1038 1040 1042 1045 1048
1055 1063 1071 1122 1123 1124 1126 1128 1130 1131 1132 1134 1136
1138 1139 1140 1142 1144 1146 1147 1148 1150 1151 1153 1154 1155
1159 1163 1167 1174 1176 1179 1182 1184 1187 1190 1192 1195 1198
1200 1202 1204 1206 1210 1216 1222 1234 1235 1236 1237 1279 1280
1281 1283 1285 1287 1288 1289 1291 1293 1295 1296 1297 1299 1300
1303 1304 1305 1307 1308 1310 1311 1313 1320 1328 1336 1403 1404
1409 1412 1415 1418 1421 1425 1429 1433 1437 1441 1445 1448 1451
1454 1457 1460 1463 1466 1469 1472 1475 1478 1482 1486 1489 1491
1497 1500 1504 1508 1511 1515 1519 1522 1526 1530 1533 1536 1539
1542 1545 1548 1552 1556 1559 1563 1567 1570 1574 1578 1581 1584
1589 1592 1596 1600 1603 1606 1609 1612 1615 1618 1622 1626 1629
1633 1637 1640 1644 1648 1651 1655 1659 1662 1666 1670 1673 1677
1679 1682 1685 1688 1692 1696 1699 1703 1707 1710 1714 1718 1721

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1725	1729	1732	1736	1740	1743	1746	1749	1752	1755	1758	1762	1766
1769	1773	1777	1780	1784	1788	1791	1795	1799	1802	1806	1810	1813
1816	1819	1822	1825	1828	1832	1836	1839	1843	1847	1850	1854	1858
1861	1865	1869	1872	1876	1880	1883	1886	1889	1898	1909	1920	1931
1942	1953											

✱

✱

✱✱✱ THE INTERNAL PRESSURE LOAD IS APPLIED

✱

LOADS ELEMENT

1 -2 700

STEP 1 TO

120 -2 700

55 -3 700

STEP 1 TO

60 -3 700

115 -3 700

STEP 1 TO

120 -3 700

126 -3 700

STEP 6 TO

192 -3 700

203 -2 700

204 -2 700

215 -3 700

STEP 12 TO

287 -3 700

216 -3 700

STEP 12 TO

288 -3 700

✱

✱

✱✱✱ CONSTRUCT THE ENTIRE HEADER

✱

REUSE 1 1 1 2

REUSE 2 1 3 4

✱✱✱ THE FOLLOWING DEFINE THE GRAPHICS FOR THE HEADER

✱

FRAME XFMAX= 22.5 YFMAX= 17.0 XSF= 1.0 YSF= 0.5

VIEW ID=1 XVIEW=1 YVIEW=-1 ZVIEW=1

MESH VIEW=1 PLOTAREA=0

✱

✱

ADINA

✱

✱

✱✱✱

✱

END

APPENDIX D. INLET HEADER: 25% STEAM FLOW, 0 DEGREES I/C

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
55	111	-1.86906E+03	2.22908E+04	3.20889E+03	-1.43862E+03	1.81466E+03	-1.36231E+04
55	112	-2.08767E+03	2.02106E+04	3.12875E+03	-2.52313E+03	1.92729E+03	-1.29157E+04
55	113	-2.23443E+03	1.85921E+04	2.82880E+03	-3.62855E+03	2.00339E+03	-1.26890E+04
55	121	-9.17504E+01	2.75159E+04	3.68309E+03	-4.88752E+02	1.15587E+03	-1.02084E+04
55	122	-4.56482E+02	2.49863E+04	3.84083E+03	-1.67082E+03	1.21933E+03	-9.83867E+03
55	123	-8.37336E+02	2.27554E+04	3.64792E+03	-2.86395E+03	1.23903E+03	-9.69317E+03
55	131	1.53351E+03	3.22039E+04	4.03641E+03	-3.70875E+01	7.51373E+02	-6.70088E+03
55	132	1.04961E+03	2.92721E+04	4.47370E+03	-1.29921E+03	7.52370E+02	-6.68722E+03
55	133	4.72664E+02	2.6467E+04	4.44628E+03	-2.53380E+03	7.03343E+02	-6.84831E+03
55	211	-2.12842E+03	1.82093E+03	2.01998E+03	-3.62520E+01	2.06991E+03	-6.14197E+03
55	212	-1.94246E+03	1.66335E+03	1.47238E+03	-9.86306E+02	1.89875E+03	-5.11538E+03
55	213	-1.65423E+03	1.46334E+03	1.00783E+03	-1.89889E+03	1.74033E+03	-4.42450E+03
55	221	-1.19717E+03	6.35399E+03	3.97577E+03	-3.86742E+02	1.36763E+03	-5.57132E+03
55	222	-9.92306E+02	5.68259E+03	3.46630E+03	-6.95466E+02	1.23616E+03	-4.67498E+03
55	223	-8.62783E+02	4.83018E+03	2.88616E+03	-1.73751E+03	1.10609E+03	-4.05137E+03
55	231	-4.06474E+02	1.03123E+04	5.56980E+03	5.48864E+02	8.37275E+02	-4.70787E+03
55	232	-2.43321E+02	9.17750E+03	5.14582E+03	-6.64015E+02	7.39424E+02	-3.46109E+03
55	233	-2.32012E+02	7.74062E+03	4.51666E+03	-1.83087E+03	6.33120E+02	-3.46109E+03
55	311	-1.84836E+03	-1.19121E+03	3.32891E+03	-6.83205E+01	-1.25588E+02	1.51464E+02
55	312	-1.66019E+03	-6.17308E+02	1.55107E+03	-1.75669E+02	9.38846E+01	6.15401E+02
55	313	-1.87121E+03	-1.12147E+03	-4.80564E+02	-1.70609E+02	3.22980E+02	9.82564E+02
55	321	-1.68265E+03	-8.57467E+02	6.13376E+03	4.72660E+00	-3.01328E+02	-5.01303E+02
55	322	-1.21393E+03	-3.19621E+02	4.57270E+03	-3.50111E+02	-1.77036E+01	-5.73118E+01
55	323	-1.20346E+03	-9.32554E+02	2.62682E+03	-5.91068E+02	2.63578E+02	3.40832E+02
55	331	-1.73389E+03	-8.68332E+02	8.37847E+03	-1.74264E+01	-4.42035E+02	-7.93627E+02
55	332	-9.70255E+02	-3.45530E+02	7.06153E+03	-5.85965E+02	-8.52663E+01	-3.96480E+02
55	333	-7.20150E+02	-1.03697E+03	5.24521E+03	-1.07420E+03	2.58712E+02	-6.93280E+01
56	111	-6.04119E+00	4.37116E+04	5.20208E+03	2.03691E+03	2.48737E+02	1.38352E+04
56	112	9.06727E+02	4.40691E+04	6.65122E+03	2.64527E+03	8.37181E+02	1.43920E+04
56	113	1.355150E+03	4.36690E+04	7.29128E+03	3.25230E+03	1.43149E+03	1.44783E+04
56	121	-1.21235E+03	3.94035E+04	2.41267E+03	1.59757E+03	1.86121E+02	9.19365E+03
56	122	-5.09564E+02	3.91633E+04	3.71512E+03	2.06696E+03	6.81296E+02	9.94948E+03
56	123	-1.93952E+02	3.83618E+04	4.28626E+03	2.53052E+03	1.18046E+03	1.02525E+04
56	131	-1.34417E+03	3.77197E+04	8.21333E+02	1.50199E+03	2.10728E+02	4.95026E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
56	132	-9.07762E+02	3.67360E+04	1.93434E+03	1.81051E+03	6.03603E+02	5.90329E+03
56	133	-7.87799E+02	3.53627E+04	2.38037E+03	2.10927E+03	9.98795E+02	6.41890E+03
56	211	1.380097E+03	6.35793E+04	6.62574E+03	5.58695E+00	-1.32740E+03	4.49472E+01
56	212	1.86992E+03	6.35807E+04	6.96072E+03	-7.13335E+00	1.98798E+02	1.51758E+00
56	213	1.45743E+03	6.19239E+04	5.93630E+03	1.88366E+01	1.70048E+03	-2.42660E+02
56	221	-7.12911E+02	5.39814E+04	2.53726E+03	9.01316E+00	-1.14975E+03	8.92526E+01
56	222	-1.13745E+02	5.40991E+04	3.28671E+03	-1.60927E+02	1.91830E+02	-6.89816E+00
56	223	-3.16351E+02	5.27946E+04	2.77653E+03	-3.35215E+02	1.50899E+03	-3.11692E+02
56	231	-1.49881E+03	4.75065E+04	-2.29827E+02	-7.95991E+01	-8.69641E+02	1.13131E+02
56	232	-8.77952E+02	4.75327E+04	8.45459E+02	-3.54065E+02	2.87366E+02	-2.35173E+01
56	233	-9.71665E+02	4.63425E+04	7.48445E+02	-6.87552E+02	1.42001E+03	-3.75705E+02
56	311	8.54279E+01	4.49051E+04	6.46308E+03	-1.93529E+03	1.62128E+02	-1.45195E+04
56	312	1.07741E+03	4.56290E+04	7.70146E+03	-2.53283E+03	9.80467E+02	-1.49201E+04
56	313	1.22542E+03	4.48839E+04	7.58709E+03	-3.15039E+03	1.74729E+03	-1.52530E+04
56	321	-1.44823E+03	3.95936E+04	2.72049E+03	-1.26035E+03	-9.97614E+00	-9.77276E+03
56	322	-5.39568E+02	4.00643E+04	4.29958E+03	-2.01762E+03	6.93488E+02	-1.04567E+04
56	323	-3.85672E+02	3.92707E+04	4.62120E+03	-2.79960E+03	1.34751E+03	-1.11046E+04
56	331	-1.70654E+03	3.70992E+04	3.31647E+02	-1.01162E+03	1.70516E+01	-5.47364E+03
56	332	-9.68879E+02	3.71146E+04	2.15968E+03	-1.90223E+03	5.94474E+02	-6.41274E+03
56	333	-9.07864E+02	3.60445E+04	2.81369E+03	-2.82160E+03	1.12425E+03	-7.34329E+03
57	111	-2.82635E+03	-2.37157E+03	1.99292E+03	4.75648E+02	-1.04428E+03	-1.06713E+03
57	112	-2.15976E+03	-1.96603E+03	7.46214E+02	3.21773E+02	-2.23153E+02	-1.36051E+03
57	113	-1.78000E+03	-2.21663E+03	-8.00957E+02	2.37952E+02	5.67900E+02	-1.45486E+03
57	121	-2.44298E+03	-2.33155E+03	4.69743E+03	5.69411E+02	-6.98056E+02	6.62527E+02
57	122	-1.93976E+03	-1.92856E+03	3.39564E+03	5.62251E+02	9.11763E+01	-1.27162E+02
57	123	-1.76001E+03	-2.23504E+03	1.72506E+03	6.26022E+02	8.57775E+02	-7.94067E+02
57	131	-2.20647E+03	-2.53538E+03	7.09793E+03	6.46877E+02	4.74274E+01	28.06380E+03
57	132	-1.89572E+03	-2.15778E+03	5.66635E+03	7.87205E+02	8.11954E+02	7.87262E+02
57	133	-1.94034E+03	-2.53617E+03	3.80655E+03	9.99219E+02	1.56030E+03	-4.20511E+02
57	211	-1.50071E+03	1.89910E+03	1.97925E+03	-1.13132E+02	1.58551E+03	4.48287E+03
57	212	-1.36745E+03	1.05504E+03	1.00323E+03	7.22836E+02	1.66855E+03	3.95893E+03
57	213	-9.51882E+02	9.40210E+02	2.38977E+02	1.57804E+03	1.171485E+03	3.63308E+03
57	221	-7.56733E+02	5.91216E+03	3.11675E+03	-2.17894E+02	9.78915E+02	4.44140E+03
57	222	-6.46706E+02	4.88292E+03	2.47987E+03	5.83076E+02	1.05456E+03	3.81423E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
57	223	-3.32465E+02	4.43110E+03	1.94643E+03	1.36886E+03	1.10046E+03	3.31255E+03
57	231	-2.24295E+02	9.42207E+03	4.13549E+03	-1.41199E+02	6.90330E+02	4.15160E+03
57	232	-1.66093E+02	8.19943E+03	3.75057E+03	5.82315E+02	7.1587E+02	3.42193E+03
57	233	2.81611E+01	7.42158E+03	3.7457E+03	1.3251E+03	7.89244E+02	2.75430E+03
57	311	-1.85026E+03	2.04017E+04	2.13090E+03	1.14021E+03	1.67074E+03	1.20246E+04
57	312	-2.40382E+03	1.75849E+04	1.63377E+03	2.24042E+03	1.62727E+03	1.16430E+04
57	313	-2.66800E+03	1.61701E+04	1.37247E+03	3.32235E+03	1.57400E+03	1.11407E+04
57	321	-2.00407E+02	2.57575E+03	2.75767E+03	6.09373E+02	1.09619E+03	8.63494E+03
57	322	-7.34847E+02	2.27211E+04	2.51791E+03	1.51786E+03	1.00166E+03	8.62962E+03
57	323	-8.74979E+02	2.08821E+04	2.39840E+03	2.41390E+02	9.01951E+02	8.44905E+03
57	331	1.21110E+03	3.05492E+04	3.38312E+03	5.03643E+02	7.03425E+02	5.22016E+03
57	332	6.73715E+02	2.72894E+04	3.33029E+03	1.20250E+03	5.44523E+02	5.56668E+03
57	333	4.46631E+02	2.50482E+04	3.29695E+03	1.89407E+03	3.84645E+02	5.49036E+03
58	111	-1.67091E+03	2.14133E+04	4.01597E+03	8.44279E+02	-1.28416E+03	-1.34282E+04
58	112	-2.52680E+03	1.82222E+04	3.03981E+03	2.17448E+03	-1.52597E+03	-1.26775E+04
58	113	-2.62455E+03	1.66551E+04	2.97008E+03	3.47145E+03	-1.77430E+03	-1.18481E+04
58	121	-1.89255E+02	2.63817E+04	5.25630E+03	5.09195E+02	-1.00348E+03	-1.02594E+04
58	122	-1.08448E+03	2.29601E+04	4.20990E+03	1.63128E+03	-1.29154E+03	-9.76448E+03
58	123	-1.30213E+03	2.09774E+04	3.98705E+03	2.72729E+03	-1.59175E+03	-9.14981E+03
58	131	9.22688E+02	3.06815E+04	6.08786E+03	5.50238E+02	-8.64723E+02	-6.91028E+03
58	132	4.65334E+01	2.70975E+04	5.09750E+03	1.45076E+03	-1.18923E+03	-6.72123E+03
58	133	-2.22335E+02	2.47907E+04	4.85861E+03	2.33152E+03	-1.53080E+03	-6.37513E+03
58	211	-2.59333E+03	1.88987E+03	6.80502E+03	-4.02869E+02	-1.20485E+03	-7.98617E+03
58	212	-2.57577E+03	1.15369E+03	5.42934E+03	4.17411E+02	-8.51615E+02	-6.42495E+03
58	213	-2.10283E+03	1.28306E+03	4.70090E+03	1.24548E+03	-6.45985E+02	-5.14064E+03
58	221	-1.60039E+03	6.05609E+03	8.81142E+03	-4.78305E+02	-1.31213E+03	-6.70130E+03
58	222	-1.83707E+03	4.91077E+03	7.14194E+03	2.88988E+02	-9.43969E+02	-5.52716E+03
58	223	-1.67659E+03	4.50345E+03	6.05965E+03	1.06891E+03	-5.52118E+02	-4.56725E+03
58	231	-9.68026E+02	9.56998E+03	1.03041E+04	3.19920E+02	-1.30687E+03	-5.10829E+03
58	232	-1.39840E+03	8.09639E+03	8.46812E+03	3.12171E+02	-9.18737E+02	-4.35659E+03
58	233	-1.48074E+03	7.24936E+03	7.16690E+03	1.04041E+03	-5.14524E+02	-3.76423E+03
58	311	-2.55649E+03	3.32664E+03	1.77789E+04	4.42569E+02	-6.80592E+02	9.83306E+02
58	312	2.02742E+03	2.65950E+03	1.36322E+04	2.41844E+02	-1.63330E+02	1.37830E+03
58	313	1.38601E+03	1.50191E+03	9.60339E+03	1.08314E+02	3.85131E+02	1.41542E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
58	321	1.82942E+03	2.25197E+03	1.78806E+04	5.20154E+02	-1.02264E+03	1.60730E+03
58	322	1.41716E+03	1.85802E+03	1.43203E+04	4.69790E+02	-3.77508E+02	1.47165E+03
58	323	8.77512E+02	9.42238E+02	1.00586E+04	4.87613E+02	2.89473E+02	1.04363E+03
58	331	9.04383E+02	8.70327E+02	1.75521E+04	1.75509E+02	-9.51785E+02	2.58552E+03
58	332	6.32941E+02	7.88295E+02	1.46274E+04	6.76097E+02	-1.84730E+02	1.88991E+03
58	333	2.21041E+02	1.49211E+02	1.17846E+04	8.46509E+02	5.96300E+02	9.59510E+02
59	111	-2.39913E+01	4.58431E+04	7.14672E+03	-1.55155E+03	-1.56251E+02	1.60004E+04
59	112	5.22690E+02	4.64700E+04	8.08514E+03	-2.01657E+03	-1.13745E+03	1.59367E+04
59	113	4.67159E+02	4.58391E+04	8.26511E+03	-2.48301E+03	-2.13893E+03	1.58771E+04
59	121	1.58549E+03	4.00765E+04	3.78797E+03	-9.61934E+02	-8.90700E+01	1.13333E+04
59	122	-9.61145E+02	4.05276E+04	4.79612E+03	-1.61460E+03	-1.15975E+03	1.15903E+04
59	123	-9.06783E+02	3.98873E+04	5.23196E+03	-2.28919E+03	-2.25114E+03	1.18770E+04
59	131	-1.61386E+03	3.71690E+04	1.60816E+03	-7.16494E+02	-1.36304E+02	7.08931E+03
59	132	-1.07169E+03	3.72515E+04	2.8309E+03	-1.56698E+03	-1.28406E+03	7.65071E+03
59	133	-9.96259E+02	3.63870E+04	3.43821E+03	-2.42083E+03	-2.45296E+03	8.26419E+03
59	211	1.33080E+03	6.28656E+04	6.33378E+03	5.49435E+02	1.44139E+03	3.68228E+02
59	212	1.38602E+03	6.24982E+04	6.27710E+03	5.61829E+02	-2.98415E+02	2.19138E+02
59	213	8.62563E+02	6.08615E+04	5.56976E+03	5.63914E+02	-2.06547E+03	3.49961E+02
59	221	-6.28350E+02	5.36000E+04	2.49335E+03	4.02790E+02	1.30887E+03	3.95933E+02
59	222	-3.11819E+02	5.34400E+04	2.82869E+03	2.38615E+02	-4.35227E+02	2.90166E+02
59	223	-4.93363E+02	5.22010E+04	2.66400E+03	6.32541E+01	-2.20673E+03	4.70919E+02
59	231	-1.20835E+03	4.73751E+04	-2.08858E+02	2.31583E+02	1.07560E+03	4.15950E+02
59	232	-7.14734E+02	4.72242E+04	6.1140E+02	-1.04239E+02	-6.73091E+02	3.58161E+02
59	233	-6.48677E+02	4.61604E+04	9.17668E+02	-4.52032E+02	-2.44913E+03	5.92705E+02
59	311	6.94260E+02	4.34458E+04	6.09700E+03	2.25813E+03	-2.95481E+02	-1.30200E+04
59	312	9.51119E+02	4.29976E+04	6.45591E+03	2.85462E+03	-1.12508E+03	-1.36654E+04
59	313	1.01812E+03	4.21157E+04	6.60931E+03	3.42824E+03	-1.98477E+03	-4.37669E+04
59	321	-7.04062E+02	3.95973E+04	2.96178E+03	1.72707E+03	-4.60083E+01	-8.62205E+03
59	322	-4.26962E+02	3.87354E+04	3.5537E+03	2.20953E+03	-9.54863E+02	-9.43244E+03
59	323	-2.74741E+02	3.75981E+04	4.00041E+03	2.66844E+03	-1.89363E+03	-9.71278E+03
59	331	-1.04266E+03	3.82099E+04	1.00057E+03	1.52718E+03	4.16336E+01	-4.62448E+03
59	332	-8.05601E+02	3.67938E+04	1.76434E+03	1.87460E+03	-9.37827E+02	-5.58284E+03
59	333	-6.36017E+02	3.52410E+04	2.43694E+03	2.19787E+03	-1.94703E+03	-6.02318E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-YZ	STRESS-XZ
60	111	5.81862E+02	1.73995E+03	1.12178E+04	-2.09094E+02	-4.95200E+02	9.22352E+02
60	112	1.49380E+02	1.71825E+03	8.09898E+03	-2.22636E+02	-4.15557E+02	1.49278E+02
60	113	-7.63663E+02	5.03018E+02	4.15719E+03	-1.13448E+02	-3.34182E+02	-1.55668E+02
60	121	3.65641E+02	1.57592E+03	1.29946E+04	-1.29780E+02	-6.90124E+02	1.54920E+02
60	122	3.24612E+02	1.62192E+03	1.02990E+04	-3.96955E+02	-4.09954E+02	8.15224E+02
60	123	-1.98062E+02	4.63878E+02	7.20101E+03	-5.40651E+02	-1.21840E+02	5.12681E+02
60	131	3.70107E+01	1.16037E+03	1.40272E+04	-1.08582E+02	-9.12819E+02	1.83451E+02
60	132	3.79973E+02	1.27287E+03	1.21072E+04	-6.30507E+02	-4.41488E+02	1.16317E+03
60	133	2.40255E+02	1.72195E+02	9.41449E+03	-1.02832E+03	4.32466E+01	8.91159E+02
60	211	-2.16984E+03	4.03638E+03	7.44264E+03	-2.85424E+02	-1.92779E+02	9.01143E+03
60	212	-2.32076E+03	3.57308E+03	6.77753E+03	-9.7910E+02	-1.74910E+03	7.43640E+03
60	213	-2.64844E+03	2.74348E+03	5.08995E+03	-1.63609E+03	-1.59145E+03	6.34044E+03
60	221	-1.33341E+03	7.89774E+03	8.77401E+03	1.43415E+02	-1.65459E+02	8.23255E+03
60	222	-1.46452E+03	6.96856E+03	7.73722E+03	-7.19913E+02	-1.43303E+03	6.83312E+03
60	223	-1.79752E+03	5.60711E+03	6.49665E+03	-1.50541E+03	-1.22658E+03	5.87984E+03
60	231	-5.36359E+02	1.13384E+04	9.94579E+03	3.28526E+02	-1.49625E+03	7.20679E+03
60	232	-6.31337E+02	9.98001E+03	8.95500E+03	-6.84382E+02	-1.22955E+03	6.00136E+03
60	233	-9.50102E+02	8.13173E+03	7.70744E+03	-1.61637E+03	-9.72795E+02	5.21329E+03
60	311	-1.57844E+03	2.56529E+04	5.99429E+03	-1.47653E+03	-1.83518E+03	1.65094E+04
60	312	-2.20743E+03	2.33614E+04	5.82378E+03	-2.41361E+03	-2.12284E+03	1.53222E+04
60	313	-2.75677E+03	2.13651E+04	5.62615E+03	-3.31904E+03	-2.42277E+03	1.44409E+04
60	321	5.40152E+01	3.00427E+04	6.40375E+03	-5.26663E+02	-1.42065E+03	1.29701E+04
60	322	-6.805730E+02	2.72386E+04	6.18263E+03	-1.58626E+03	-1.78635E+03	1.21313E+04
60	323	-1.38728E+03	2.46283E+04	5.89707E+03	-2.60897E+03	-2.16057E+03	1.15788E+04
60	331	1.80825E+03	3.41159E+04	6.88702E+03	-3.55970E+01	-1.16146E+03	9.38502E+03
60	332	9.82047E+02	3.08440E+04	6.65052E+03	-1.20627E+03	-1.59652E+03	8.91065E+03
60	333	1.57695E+02	2.76773E+04	6.31711E+03	-2.33552E+03	-2.03685E+03	8.70537E+03
115	111	-4.03337E+02	6.46793E+03	7.97831E+02	-1.71912E+03	1.13089E+03	-4.06648E+03
115	112	-7.91922E+02	6.51226E+03	1.37870E+03	-8.80345E+02	2.94900E+02	-4.75366E+03
115	113	-1.02812E+03	1.94343E+03	1.94343E+03	-1.60686E+01	-4.41415E+02	-5.17872E+03
115	121	-2.93397E+02	7.39066E+03	1.21148E+03	-1.96365E+03	7.36951E+02	-2.82876E+03
115	122	-6.41783E+02	7.45171E+02	1.58092E+03	-1.01383E+03	-3.96343E+01	-3.52624E+03
115	123	-8.59440E+02	7.96853E+03	1.93069E+03	-2.91330E+01	-7.01100E+02	-3.95858E+03
115	131	-1.21944E+02	8.27128E+03	1.69633E+03	-2.18938E+03	3.09427E+02	-1.60330E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
115	132	-4.29913E+02	8.32926E+03	1.87623E+03	-1.12901E+03	-4.10143E+02	-2.31272E+03
115	133	-6.27865E+02	8.79736E+03	2.00132E+03	-5.40158E+01	1.00094E+03	-2.75431E+03
115	211	-6.70719E+02	-1.81272E+01	3.52875E+02	-2.87912E+02	6.59319E+02	-1.75183E+03
115	212	-1.32676E+03	-1.65632E+02	7.79085E+02	2.01074E+02	9.66871E+01	-1.99379E+03
115	213	-1.75683E+03	3.66291E+02	1.27108E+03	6.42724E+02	-4.70278E+02	-2.11827E+03
115	221	-5.78618E+02	8.68675E+02	8.01567E+02	-4.51379E+02	6.89029E+02	-1.39912E+03
115	222	-1.31129E+03	7.15021E+02	1.13775E+03	1.55802E+02	1.64920E+02	-1.69923E+03
115	223	-1.83316E+03	1.20064E+03	1.52480E+03	7.04596E+02	-3.36795E+02	-1.87695E+03
115	231	-4.64334E+02	1.65453E+02	1.26508E+03	-5.88177E+02	6.62500E+02	-9.84973E+02
115	232	-1.27828E+03	1.48514E+03	1.50023E+03	1.36510E+02	1.77582E+02	-1.33857E+03
115	233	-1.89785E+03	1.91689E+03	1.7182E+03	7.89341E+02	-2.65026E+02	-1.56549E+03
115	311	-4.11564E+02	-4.02261E+02	-3.83659E+01	-2.12427E+02	-3.9404E+02	6.87646E+02
115	312	-1.38688E+03	-4.47955E+02	-2.41138E+02	1.44203E+02	-4.60803E+02	5.75305E+02
115	313	-2.13298E+03	1.80924E+02	-3.51932E+02	2.99325E+02	-5.20666E+02	4.36239E+02
115	321	-6.78359E+02	-7.42144E+02	3.79976E+02	4.87144E+00	-1.63758E+02	4.67696E+02
115	322	-1.83895E+03	-8.30230E+02	2.11292E+02	4.69695E+02	-2.21846E+02	3.00070E+02
115	323	-2.78263E+03	-2.73995E+02	1.23905E+02	7.36969E+02	-2.49744E+02	1.11314E+02
115	331	-9.37584E+02	-1.13309E+03	7.49727E+02	2.29264E+02	-8.18407E+00	3.55650E+02
115	332	-2.29055E+03	-1.27695E+03	5.85685E+02	7.99219E+02	-5.68438E+01	1.39136E+02
115	333	-3.43657E+03	-8.05695E+02	4.92409E+02	1.17574E+03	-5.46338E+01	-9.36422E+01
116	111	5.08803E+02	2.27003E+04	3.67636E+03	-4.25393E+03	-1.96327E+03	7.87523E+03
116	112	4.68756E+02	2.40317E+04	4.26268E+03	-1.69718E+03	-6.30338E+02	8.71087E+03
116	121	-5.13521E+02	3.5129E+04	3.59046E+03	9.43891E+02	5.32324E+02	8.84141E+03
116	123	-4.07955E+02	1.92134E+04	1.40405E+03	4.33131E+03	-1.49189E+03	4.97124E+03
116	122	-4.72627E+02	2.06998E+04	2.56705E+03	-1.93747E+03	-2.97005E+02	5.98970E+03
116	123	-1.35119E+03	2.06183E+04	2.61129E+03	5.69040E+02	7.33869E+02	6.35048E+03
116	131	-7.53341E+02	1.72799E+04	-1.46302E+02	-1.46372E+03	-9.27340E+02	3.34980E+03
116	132	-9.23177E+02	1.87598E+04	1.50530E+03	-2.09183E+03	1.34578E+02	3.51593E+03
116	133	-1.79116E+03	1.89240E+04	2.16304E+03	2.90955E+02	1.03707E+03	4.06621E+03
116	211	2.21439E+03	2.77720E+04	2.53618E+03	-5.59021E+03	-3.55801E+02	-9.90136E+02
116	212	2.71125E+03	2.93175E+04	2.74558E+03	-3.55632E+03	1.70706E+02	-2.64011E+02
116	213	1.19300E+03	2.88380E+04	1.87651E+03	-1.50887E+03	6.59315E+02	1.50436E+02
116	221	7.47474E+02	2.34980E+04	7.87037E+02	-5.21203E+03	-2.28432E+02	-1.63669E+03
116	222	7.34819E+02	2.50161E+04	1.27229E+03	-3.28691E+03	2.37690E+02	-7.81759E+02

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
116	223	-9.46872E+01	2.47861E+04	7.96987E+02	-1.32267E+03	6.64969E+02	-2.17562E+02
116	231	-1.58772E+02	2.06203E+04	-3.76564E+02	-4.86350E+03	-5.62358E+01	-2.23775E+03
116	232	-1.71811E+02	2.20393E+04	3.53775E+02	-3.02538E+03	3.49487E+02	-1.27647E+03
116	233	-8.98040E+02	2.19522E+04	2.26770E+02	-1.12600E+03	7.115256E+02	-5.87261E+02
116	311	7.19954E+02	1.58222E+04	1.31656E+03	5.18022E+03	1.17101E+03	-5.36456E+03
116	312	1.03319E+03	1.77956E+04	2.18613E+03	-3.04490E+03	1.14729E+03	-5.89996E+03
116	313	9.18277E+02	1.87183E+04	2.66993E+03	-2.44908E+03	6.75282E+02	-2.80808E+03
116	321	1.92498E+02	1.49210E+04	9.35753E+02	-5.11003E+03	1.31027E+03	-4.04624E+03
116	322	3.66861E+02	1.63646E+04	1.51496E+03	-3.76798E+03	7.97076E+02	-4.48737E+03
116	323	1.87373E+02	1.69096E+04	1.77400E+03	-2.37127E+03	3.73127E+02	-4.78507E+03
116	331	1.08851E+02	1.49346E+04	9.84279E+02	-5.12535E+03	9.34327E+02	-2.85583E+03
116	332	1.62835E+02	1.58415E+04	1.31192E+03	-3.75697E+03	4.68615E+02	-3.22505E+03
116	333	-7.34567E+01	1.60477E+04	1.37258E+03	-2.29578E+03	8.47284E+01	-3.46032E+03
117	111	-2.52228E+03	-1.05806E+03	1.08455E+04	1.90459E+02	-3.03941E+02	1.70476E+03
117	112	-1.37349E+03	-7.30656E+02	9.39640E+03	3.73399E+02	-8.72330E+01	7.71306E+02
117	113	-1.06179E+03	-2.62346E+03	7.37142E+03	9.88027E+02	-4.88838E+01	4.03836E+02
117	121	-1.48745E+03	-5.99000E+02	1.18939E+04	-1.61300E+02	-5.53748E+02	1.57684E+03
117	122	-8.22176E+02	5.02186E+02	1.05875E+04	7.19580E+02	-3.87528E+02	6.82913E+02
117	123	-1.10244E+03	-8.43255E+02	8.56546E+03	-2.06437E+02	-3.72536E+02	2.40916E+02
117	131	-1.27286E+03	-6.96466E+02	1.24093E+04	-7.11860E+02	-7.16565E+02	1.31657E+03
117	132	-1.10833E+03	1.23032E+03	1.12924E+04	9.02037E+02	-5.87021E+02	4.85511E+02
117	133	-1.99557E+03	4.84239E+02	9.32538E+03	3.01336E+03	-5.85017E+02	6.98789E+00
117	211	-2.53953E+03	3.11272E+03	6.01896E+03	-1.32055E+03	2.65047E+02	6.61408E+03
117	212	-2.44192E+03	2.72804E+03	5.26663E+03	1.73762E+02	8.79914E+02	5.50639E+02
117	213	-2.35296E+03	2.11761E+03	4.70981E+03	1.92650E+03	1.19581E+03	4.99082E+03
117	221	-8.15226E+02	5.76356E+03	7.12178E+03	-2.06875E+03	-2.56007E+02	5.85131E+03
117	222	-1.22997E+03	5.51968E+03	6.44769E+03	-2.39021E+02	2.65218E+02	4.76248E+03
117	223	-1.76726E+03	4.75825E+03	5.80514E+03	1.08495E+03	5.12213E+02	4.15351E+03
117	231	3.51383E+02	7.98833E+03	7.89211E+03	-2.78928E+03	-5.92251E+02	4.99437E+03
117	232	-5.57016E+02	7.93228E+03	7.34921E+03	-6.06210E+02	-1.57429E+02	3.94600E+02
117	233	-1.72374E+03	7.09380E+03	6.69141E+03	1.90599E+03	2.44385E+01	3.27975E+03
117	311	-1.10182E+03	1.47618E+04	3.28314E+03	-2.41401E+03	-1.01631E+03	9.60037E+03
117	312	-2.80171E+03	1.30148E+04	2.53663E+03	-2.16510E+01	1.89613E+02	9.11946E+03
117	313	-3.06605E+03	1.21845E+04	2.22214E+03	2.47777E+03	1.11995E+03	8.74075E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
117	321	8.16163E+02	1.77966E+04	3.84281E+03	-3.40827E+03	-1.16942E+03	7.57200E+03
117	322	-6.30236E+02	1.59976E+04	3.49255E+03	-1.07604E+03	-5.63965E+01	7.22993E+03
117	323	-1.80996E+03	1.48212E+04	3.42344E+03	1.45579E+03	7.94177E+02	6.91366E+03
117	331	2.45906E+03	2.06089E+04	4.27844E+03	4.32185E+03	-1.09590E+03	5.53272E+03
117	332	7.59530E+02	1.87798E+04	4.36002E+03	-1.8674E+03	-7.49206E+01	5.34572E+03
117	333	-8.00097E+02	1.73214E+04	4.59409E+03	6.77818E+02	6.94116E+02	5.11780E+03
118	111	-1.50282E+03	1.44259E+04	2.30692E+03	-2.49338E+03	1.09277E+03	-9.44766E+03
118	112	-2.74230E+03	1.26660E+04	1.62619E+03	7.47937E+01	-2.35379E+02	-8.91649E+03
118	113	-3.56183E+03	1.17954E+04	1.48266E+03	2.71528E+03	-1.30443E+03	-8.50632E+03
118	121	6.42412E+02	1.79932E+04	3.43784E+03	-3.70989E+03	1.23059E+03	-7.46972E+03
118	122	-8.97591E+02	1.61038E+04	3.01354E+03	-1.09912E+03	7.29153E-01	-7.10560E+03
118	123	-2.14464E+03	1.48098E+04	2.97235E+03	1.61644E+03	-9.84610E+02	-6.78699E+03
118	131	2.43204E+03	2.12693E+04	4.36411E+03	-4.66403E+03	1.15058E+03	-5.44963E+03
118	132	6.00283E+02	1.92773E+04	4.23076E+03	-2.00581E+03	1.73551E+01	-5.27220E+03
118	133	-1.04594E+03	1.76277E+04	4.37709E+03	7.86780E+02	-8.83209E+02	-5.07457E+03
118	211	-3.05383E+03	2.15922E+03	6.85334E+03	-1.38402E+03	-2.75777E+02	-6.56626E+03
118	212	-2.99379E+03	1.95210E+03	5.95334E+03	1.79074E+02	-9.56001E+02	-5.35080E+03
118	213	-2.93477E+03	1.48553E+03	5.30985E+03	1.98814E+03	-1.33993E+03	-4.73219E+03
118	221	-1.28998E+03	5.11003E+03	7.98707E+03	-2.19582E+03	1.57189E+02	-5.82550E+03
118	222	-1.73691E+03	4.98921E+03	7.14472E+03	-2.70316E+02	-4.32099E+02	-4.64775E+03
118	223	-2.31421E+03	4.31902E+03	6.39845E+03	1.93725E+03	-7.51687E+02	-3.95637E+03
118	231	-1.19968E+02	7.60010E+03	8.78126E+03	-2.97179E+03	4.11746E+02	-4.97274E+03
118	232	-1.07226E+03	7.61542E+03	8.04362E+03	-6.65015E+02	-9.37503E+01	-3.85675E+03
118	233	-2.27216E+03	6.81721E+03	7.25949E+03	1.95875E+03	-3.52463E+02	-3.13083E+03
118	311	3.95517E+00	1.28385E+03	1.76893E+04	1.69804E+02	-3.78919E+02	-2.73327E+02
118	312	7.45702E+02	1.29806E+03	1.52290E+04	3.59321E+02	-5.33825E+02	5.40107E+02
118	313	6.64499E+02	-9.05372E+02	1.22370E+04	9.77199E+02	-5.07055E+02	7.80055E+02
118	321	6.77203E+02	1.45448E+03	1.78664E+04	-1.89724E+02	-2.55947E+02	-2.38455E+02
118	322	9.98591E+02	2.28910E+03	1.56985E+04	7.05527E+02	-3.66416E+02	5.51451E+02
118	323	3.91378E+02	6.82367E+02	1.28053E+04	2.06141E+03	-3.24274E+02	8.79580E+02
118	331	5.70010E+02	1.10781E+03	1.76233E+04	-7.47422E+02	-2.110779E+02	-5.00770E+01
118	332	4.44033E+02	2.80594E+03	1.57696E+04	8.88763E+02	-2.88911E+02	6.88088E+02
118	333	-7.14446E+02	1.83858E+03	1.31216E+04	-3.01913E+03	-2.39798E+02	1.06201E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
119	111	9.53007E+02	1.76640E+04	1.83973E+03	-5.59940E+03	-1.83212E+03	6.10284E+03
119	112	1.38771E+03	1.96309E+04	2.63201E+03	-4.17059E+03	-1.28692E+03	6.50445E+03
119	113	1.92925E+03	2.06375E+04	3.22615E+03	-2.68413E+03	-8.04955E+02	6.81732E+03
119	121	2.96190E+02	1.64051E+04	1.37117E+03	-5.51792E+03	-1.39143E+03	4.64405E+03
119	122	5.39292E+02	1.78247E+04	1.82014E+03	-4.12307E+03	-9.30485E+02	4.95028E+03
119	123	4.67194E+02	1.83340E+04	2.12171E+03	-2.65842E+03	-5.26432E+02	5.17551E+03
119	131	1.27548E+02	1.61811E+04	1.38115E+03	-5.52384E+03	-9.77952E+02	3.33098E+03
119	132	1.92200E+02	1.70544E+04	1.51700E+03	-4.14214E+03	-5.90820E+02	3.56122E+03
119	133	1.78944E+00	1.71610E+04	1.54870E+03	-2.67739E+03	-2.55126E+02	3.71727E+03
119	211	2.39689E+03	2.95485E+04	2.63280E+03	-5.17248E+03	-4.05025E+02	1.18474E+03
119	212	2.34159E+03	3.09439E+04	2.75406E+03	-3.64520E+03	-1.86550E+02	3.87161E+02
119	213	1.43573E+03	3.03922E+04	1.99953E+03	-1.53745E+03	-7.34922E+02	-5.60002E+01
119	221	8.50956E+02	2.50466E+04	8.80739E+02	-5.33691E+03	2.74781E+02	1.88050E+03
119	222	8.00748E+02	2.64155E+04	1.21235E+03	-3.43173E+03	-2.69177E+02	9.24636E+02
119	223	4.35555E+00	2.60811E+04	7.71959E+02	-1.41844E+03	-7.69191E+02	3.02074E+02
119	231	1.13049E+02	2.20256E+04	-2.54258E+02	-5.09194E+03	1.09161E+02	2.53295E+03
119	232	1.95463E+02	2.32814E+04	2.58522E+02	-3.21800E+03	-3.87146E+02	1.43968E+03
119	233	-9.32234E+02	2.30474E+04	7.44197E+01	-1.27869E+03	-8.38634E+02	6.61172E+02
119	311	9.04597E+02	2.37600E+04	3.82147E+03	-4.13800E+03	1.92859E+03	-7.78035E+03
119	312	7.22465E+02	2.49158E+04	4.26127E+03	-1.56976E+03	5.63966E+02	-8.60517E+03
119	313	3.62140E+02	2.42290E+04	3.56344E+03	1.09123E+03	-6.55079E+02	-8.72055E+03
119	321	-5.04921E+01	2.03720E+04	1.56487E+03	-4.36166E+03	1.46017E+03	-4.69684E+03
119	322	-2.57164E+02	2.16709E+04	2.54540E+03	-1.91134E+03	2.25096E+02	-5.76498E+03
119	323	1.25169E+03	2.13735E+04	2.68351E+03	6.54055E+02	-8.68979E+02	-6.16729E+03
119	331	-4.47817E+02	1.85820E+04	1.09031E+02	-4.97333E+03	9.12173E+02	-1.90218E+03
119	332	-7.64764E+02	1.98487E+04	1.47287E+03	-2.15031E+03	-1.98696E+02	-3.17839E+03
119	333	-1.76612E+03	1.97387E+04	1.93993E+03	3.31523E+02	-1.17177E+03	-3.82691E+03
120	111	-2.35617E+02	-2.75873E+02	5.31151E+02	-2.38178E+02	1.83350E+02	-5.89653E+02
120	112	-1.34398E+03	-4.39274E+02	-5.28609E+01	1.21448E+02	2.65000E+02	-4.60887E+02
120	113	-2.23274E+03	3.45229E+01	-5.38864E+02	2.73224E+02	3.29264E+02	-3.24682E+02
120	121	-5.06469E+02	-5.97204E+02	9.33989E+02	-2.07434E+01	-4.71411E+01	-3.63696E+02
120	122	-1.79861E+03	-8.00182E+02	3.98469E+02	-4.43669E+02	-2.68378E+01	-1.86110E+02
120	123	-2.87515E+03	-3.85536E+02	-3.06764E+01	7.04729E+02	6.28950E+01	5.35749E+00
120	131	-7.64891E+02	-9.66022E+02	1.30021E+03	2.04249E+02	-1.99836E+02	-2.50053E+02

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
120	132	-2.24987E+03	-1.22410E+03	7.81034E+02	7.70439E+02	-1.35126E+02	-2.59376E+01
120	133	-3.52407E+03	-8.86403E+02	3.69224E+02	1.13787E+03	-1.26293E+02	2.10246E+02
120	211	-5.32168E+02	3.19771E+02	1.05531E+03	-4.33542E+02	-8.54638E+02	2.25503E+03
120	212	-1.17635E+03	1.85998E+02	1.25984E+03	8.83526E+01	-2.68167E+02	2.42333E+03
120	213	-1.63832E+03	5.74664E+02	1.53334E+03	5.37272E+02	3.17379E+02	2.46017E+03
120	221	-4.52403E+02	1.24619E+03	1.47230E+03	-5.92947E+02	-8.65903E+02	1.83736E+03
120	222	-1.19991E+03	1.08642E+03	1.57444E+03	2.94689E+01	-3.32322E+02	2.06599E+03
120	223	-1.76797E+03	1.43872E+03	1.75277E+03	5.70201E+02	1.80520E+02	2.16855E+03
120	231	-3.40384E+02	2.07987E+03	1.92458E+03	-7.23853E+02	-8.17091E+02	1.36115E+03
120	232	-1.19727E+03	1.88660E+03	1.90881E+03	-3.20130E+00	-3.34894E+02	1.64443E+03
120	233	-1.87831E+03	2.18641E+03	1.97437E+03	6.28417E+02	1.09181E+02	1.80648E+03
120	311	-3.52555E+02	7.41524E+03	1.25132E+03	-2.00082E+03	-1.28206E+03	4.80814E+03
120	312	-6.23568E+02	7.49000E+03	1.74763E+03	-1.07187E+03	-4.31030E+02	5.37401E+03
120	313	-7.66140E+02	7.89774E+03	2.31519E+03	-1.20257E+02	3.40647E+02	5.71080E+03
120	321	-2.55377E+02	8.35423E+03	1.66589E+03	-2.22846E+03	-8.44725E+02	3.43985E+03
120	322	-5.47586E+02	8.38424E+03	1.90505E+03	-1.22550E+03	-7.93629E+01	4.01675E+03
120	323	-7.15647E+02	8.73455E+03	2.21803E+03	-2.18584E+02	5.92936E+02	4.37156E+03
120	331	-8.15937E+01	9.25014E+03	2.17560E+03	-2.43439E+03	-3.68729E+02	2.09361E+03
120	332	-3.95743E+02	9.23302E+03	2.16018E+03	-1.35666E+03	3.13979E+02	2.68163E+03
120	333	-5.90796E+02	9.52286E+03	2.21964E+03	-2.92321E+02	8.91455E+02	3.05383E+03

APPENDIX E. INLET HEADER: 25% STEAM FLOW, 350 DEGREES I/C

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
55	111	-1.86906E+03	2.22908E+04	3.20887E+03	-1.43863E+03	1.81466E+03	-1.36231E+04
55	112	-2.08768E+03	2.02106E+04	3.12872E+03	-2.52313E+03	1.92729E+03	-1.29157E+04
55	113	-2.34442E+03	1.85922E+04	2.82878E+03	-3.62855E+03	2.00338E+03	-1.24890E+04
55	121	-9.17318E+01	2.75160E+04	3.68308E+03	-4.88756E+02	1.15587E+03	-1.02084E+04
55	122	-4.56485E+02	2.49864E+04	3.84081E+03	-1.67002E+03	1.21933E+03	-9.83868E+03
55	123	-8.37433E+02	2.27554E+04	3.64791E+03	-2.86395E+03	1.23904E+03	-6.69317E+03
55	131	1.53551E+03	3.22040E+04	4.03640E+03	3.70935E+01	7.51370E+02	-6.70088E+03
55	132	1.04961E+03	2.92722E+04	4.47368E+03	-1.29921E+03	7.52375E+02	-6.68722E+03
55	133	4.72665E+02	2.64967E+04	4.44628E+03	-2.56379E+03	7.03354E+02	-6.84831E+03
55	211	-2.21843E+03	1.82092E+03	2.01995E+03	-3.62462E+01	2.06991E+03	-6.14196E+03
55	212	-1.94247E+03	1.66334E+03	1.47324E+03	-9.84303E+02	1.89875E+03	-5.11537E+03
55	213	-1.65423E+03	1.46343E+03	1.00780E+03	-1.89889E+03	1.74034E+03	-4.42449E+03
55	221	-1.19717E+03	6.35398E+03	3.97575E+03	-3.86746E+02	1.36763E+03	-5.57131E+03
55	222	-9.92310E+02	5.68258E+03	3.46633E+03	-6.95464E+02	1.23616E+03	-4.67497E+03
55	223	-8.62783E+02	4.83018E+03	2.88614E+03	-1.73751E+03	1.10610E+03	-4.05135E+03
55	231	-4.06470E+02	1.03123E+04	5.56978E+03	5.48865E+02	8.37273E+02	-4.70786E+03
55	232	-2.43319E+02	9.17751E+03	5.14580E+03	-6.64014E+02	7.39434E+02	-3.96565E+03
55	233	-2.32006E+02	7.74063E+03	4.51665E+03	-1.83087E+03	6.33142E+02	-3.44107E+03
55	311	-1.84836E+03	-1.19121E+03	3.32892E+03	-6.83160E+01	-1.25587E+02	1.51516E+02
55	312	-1.66020E+03	-6.17319E+02	1.55107E+03	-1.75669E+02	9.38894E+01	6.15427E+02
55	313	-1.87123E+03	-1.12150E+03	-4.80577E+02	-1.70611E+02	3.22990E+02	9.82592E+02
55	321	-1.68264E+03	-8.57459E+02	6.13377E+03	4.72900E+00	-3.01329E+02	-5.01271E+02
55	322	-1.21393E+03	-3.19619E+02	4.57271E+03	-3.50113E+02	-1.76941E+01	-5.72867E+01
55	323	-1.20547E+03	-9.32561E+02	2.62682E+03	-5.91073E+02	2.63599E+02	3.40861E+02
55	331	-1.73388E+03	-8.68316E+02	8.37848E+03	1.74271E+01	-4.42038E+02	-7.93596E+02
55	332	-9.70244E+02	-3.45515E+02	7.06154E+03	-5.85969E+02	8.52524E+01	-3.96455E+02
55	333	-7.20140E+02	-1.03694E+03	5.24251E+03	-1.07421E+03	2.58743E+02	-6.64218E-01
56	111	-6.02875E+00	4.37116E+04	5.20210E+03	2.03691E+03	2.48735E+02	1.38352E+04
56	112	9.06734E+02	4.40691E+04	6.65123E+03	2.66527E+03	8.37174E+02	1.43920E+04
56	113	1.35152E+03	4.36690E+04	7.29129E+03	3.25230E+03	1.43148E+03	1.46783E+04
56	121	-1.21234E+03	3.94035E+04	2.41269E+03	1.59758E+03	1.86116E+02	9.19365E+03
56	122	-5.09566E+02	3.91633E+04	3.71512E+03	2.06696E+03	6.81293E+02	9.94948E+03
56	123	-1.93951E+02	3.83618E+04	4.28426E+03	2.50351E+03	1.18046E+03	1.02525E+04
56	131	-1.34416E+03	3.77198E+04	8.21342E+02	1.50199E+03	2.10721E+02	4.95026E+03

ELEMENT	POINT	STRESS-XX	STRESS-VY	STRESS-ZZ	STRESS-XV	STRESS-XZ	STRESS-VZ
56	132	-9.07769E+02	3.67360E+04	1.93433E+03	1.81051E+03	6.03603E+02	5.90330E+03
56	133	-7.87801E+02	3.53627E+04	2.38037E+03	2.10926E+03	9.98801E+02	6.41890E+03
56	211	1.38099E+03	6.35794E+04	6.62576E+03	5.58674E+00	-1.32741E+03	4.49459E+01
56	212	1.86993E+03	6.35808E+04	6.96073E+03	-7.13382E+00	1.98792E+02	1.51682E+00
56	213	1.45795E+03	6.19240E+04	5.93630E+03	-1.88373E+01	1.70044E+03	-2.42661E+02
56	221	-7.12901E+02	5.39814E+04	2.53728E+03	9.01367E+00	-1.14976E+03	8.92519E+01
56	222	-1.13743E+02	5.40991E+04	3.28607E+03	-1.60927E+02	1.91826E+02	-6.89851E+00
56	223	-3.16348E+02	5.29474E+04	2.77653E+03	-3.35216E+02	1.50898E+02	-3.11693E+02
56	231	-1.49880E+03	4.75066E+04	-2.29816E+03	-2.95980E+01	-8.69652E+02	1.13131E+02
56	232	-8.77953E+02	4.75327E+04	8.45655E+02	-3.54065E+02	2.87364E+02	-2.35172E+01
56	233	-9.71668E+02	4.63426E+04	7.48445E+02	-6.87554E+02	1.42001E+02	-3.75706E+02
56	311	8.54401E+01	4.49051E+04	6.46311E+03	-1.93529E+03	1.62126E+02	-1.45195E+04
56	312	1.07742E+03	4.56290E+04	7.70348E+03	-2.53283E+03	9.80464E+02	-1.49201E+04
56	313	1.22543E+03	4.48840E+04	7.58710E+03	-3.15039E+03	1.74729E+03	-1.52530E+04
56	321	-1.44822E+03	3.95937E+04	2.72051E+03	-1.26036E+03	-9.98217E+00	-9.77277E+03
56	322	-5.39569E+02	4.00643E+04	4.29959E+03	-2.01762E+03	6.93485E+02	-1.04567E+04
56	323	-3.85672E+02	3.92707E+04	4.62121E+03	-2.79960E+03	1.34751E+03	-1.11046E+04
56	331	-1.70654E+03	3.70993E+04	3.31575E+02	-1.01163E+03	1.70429E+01	-5.47365E+03
56	332	-9.68866E+02	3.71146E+04	2.15968E+03	-1.90223E+03	5.94474E+02	-6.41275E+03
56	333	-9.07875E+02	3.60445E+04	2.81369E+03	-2.82159E+03	1.12425E+03	-7.36330E+03
57	111	-2.82636E+03	-2.37158E+03	1.99294E+03	4.75645E+02	-1.04429E+03	-1.06715E+03
57	112	-2.15978E+03	-1.96605E+03	7.46232E+02	3.21774E+02	-2.23146E+02	-1.36052E+03
57	113	-1.78002E+03	-2.21665E+03	-8.00947E+02	2.37957E+02	5.67919E+02	-1.45488E+03
57	121	-2.44298E+03	-2.33155E+03	4.69746E+03	5.69410E+02	-6.98060E+02	6.69236E+02
57	122	-1.93977E+03	-1.92853E+03	3.39676E+03	5.62256E+02	9.11897E+01	-1.27180E+02
57	123	-1.70002E+03	-2.23505E+03	1.72508E+03	6.26832E+02	8.57806E+02	-7.94092E+02
57	131	-2.20646E+03	-2.53537E+03	7.09797E+03	6.46878E+02	4.74236E+01	2.06378E+03
57	132	-1.89571E+03	-2.15776E+03	5.66638E+03	7.87213E+02	8.11974E+02	7.87244E+02
57	133	-1.94033E+03	-2.53615E+03	3.80658E+03	9.99234E+02	1.56034E+03	-4.20537E+02
57	211	-1.50072E+03	1.89908E+03	1.97922E+03	-1.13139E+02	1.58550E+03	4.48285E+03
57	212	-1.36745E+03	1.05502E+03	1.00320E+03	7.22833E+02	1.66856E+03	3.95892E+03
57	213	-9.51882E+02	9.40196E+02	2.38952E+02	1.57806E+03	1.71485E+03	3.63307E+03
57	221	-7.56735E+02	5.91216E+03	3.11673E+03	-2.17898E+02	9.78912E+02	4.44159E+03
57	222	-6.46707E+02	4.88291E+03	2.47984E+03	5.63874E+02	1.05456E+03	3.81422E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
57	223	-3.32462E+02	4.43110E+03	1.94641E+03	1.36806E+03	1.10068E+03	3.31256E+03
57	231	-2.26492E+02	9.42207E+03	4.13548E+03	-1.41201E+02	6.90325E+02	4.15159E+03
57	232	-1.66089E+02	8.19943E+03	3.75056E+03	5.82312E+02	7.51597E+02	3.42192E+03
57	233	2.81494E+01	7.42159E+03	3.37956E+03	1.33250E+03	7.89268E+02	2.75428E+03
57	311	-1.85026E+03	2.04017E+04	1.23087E+03	1.14021E+03	1.67075E+03	1.20246E+04
57	312	-2.40382E+03	1.75849E+04	1.63373E+03	2.24041E+03	1.62727E+03	1.16430E+04
57	313	-2.66679E+03	1.61701E+04	1.37245E+03	3.32235E+03	1.57399E+03	1.11406E+04
57	321	-2.00409E+02	2.57575E+04	2.75765E+03	6.09376E+02	1.09619E+03	8.63493E+03
57	322	-7.34850E+02	2.27211E+04	2.51789E+03	1.51788E+03	1.00166E+03	8.62962E+03
57	323	-8.74977E+02	2.08821E+04	2.39839E+03	2.41389E+03	9.01954E+02	8.44904E+03
57	331	-1.21111E+03	3.05492E+04	3.38311E+03	5.03649E+02	7.03422E+02	5.22015E+03
57	332	6.73714E+02	2.72894E+04	3.35028E+03	1.20250E+03	5.44527E+02	5.56699E+03
57	333	4.46635E+02	2.50482E+04	3.29695E+03	1.89405E+03	3.86475E+02	5.69036E+03
58	111	-1.67090E+03	2.14133E+04	4.01607E+03	8.44261E+02	-1.28415E+03	-1.34283E+04
58	112	-2.52680E+03	1.82222E+04	3.03991E+03	2.17447E+03	-1.52595E+03	-1.26776E+04
58	113	-2.62459E+03	1.66552E+04	2.97015E+03	3.47143E+03	-1.77428E+03	-1.18482E+04
58	121	-1.89271E+02	2.63817E+04	5.25637E+03	5.09176E+02	-1.00349E+03	-1.02595E+04
58	122	-1.08448E+03	2.29601E+04	4.20999E+03	1.63128E+03	-1.29153E+03	-9.76488E+03
58	123	-1.30215E+03	2.09774E+04	3.98713E+03	2.72729E+03	-1.59173E+03	-9.14984E+03
58	131	9.22646E+02	3.06814E+04	6.08791E+03	5.50215E+02	-8.64741E+02	-6.91031E+03
58	132	4.65255E+01	2.70975E+04	5.09767E+03	1.45075E+03	-1.18923E+03	-6.72125E+03
58	133	-2.22328E+02	2.47907E+04	4.85870E+03	2.33153E+03	-1.53078E+03	-6.37516E+03
58	211	-2.59533E+03	1.88990E+03	6.80518E+03	-4.02876E+02	-1.20485E+03	-7.98624E+03
58	212	-2.57578E+03	1.15374E+03	5.42950E+03	4.17405E+02	-8.51608E+02	-6.42501E+03
58	213	-2.10285E+03	1.28311E+03	4.70106E+03	1.24547E+03	-4.65973E+02	-5.14070E+03
58	221	-1.60041E+03	6.05609E+03	8.81155E+03	-4.78321E+02	-1.31213E+03	-6.70136E+03
58	222	-1.83708E+03	4.91080E+03	7.14209E+03	2.88978E+02	-9.43963E+02	-5.52721E+03
58	223	-1.67660E+03	4.50349E+03	6.05979E+03	1.06890E+03	-5.52099E+02	-4.56730E+03
58	231	-9.68063E+02	9.56996E+03	1.03042E+04	3.99230E+02	-1.30688E+03	-5.10835E+03
58	232	-1.39841E+03	8.09642E+03	8.46825E+03	-3.12156E+02	-9.18733E+02	-4.35664E+03
58	233	-1.48074E+03	7.24940E+03	7.16703E+03	1.04040E+03	-5.14499E+02	-3.76427E+03
58	311	-2.55650E+03	3.32666E+03	1.77790E+04	-6.82569E+02	-6.80610E+02	9.85230E+02
58	312	2.02742E+03	2.65954E+03	1.36324E+04	2.41849E+02	-1.63334E+02	1.37823E+03
58	313	1.38601E+03	1.50193E+03	9.60352E+03	1.08319E+02	3.85140E+02	1.41536E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
58	321	1.82941E+03	2.25199E+03	1.78807E+04	5.20152E+02	-1.02266E+03	1.60722E+03
58	322	1.41717E+03	1.85805E+03	1.43205E+04	4.69764E+02	-3.77583E+02	1.47159E+03
58	323	8.77521E+02	9.42274E+02	1.08588E+04	4.87621E+02	2.89498E+02	1.04378E+03
58	331	9.04381E+02	8.78346E+02	1.75522E+04	1.75522E+04	-9.51797E+02	2.58545E+03
58	332	6.32954E+02	7.88337E+02	1.46275E+04	6.76710E+02	-1.84716E+02	1.88986E+03
58	333	2.21062E+02	1.49260E+02	1.17847E+04	8.46521E+02	5.96340E+02	1.59457E+02
59	111	-2.40090E+01	4.58441E+04	7.14669E+03	-1.55154E+03	-1.56257E+02	1.60006E+04
59	112	5.22655E+02	4.64700E+04	8.08513E+03	-2.01655E+03	-1.13745E+03	1.59367E+04
59	113	4.67088E+02	4.58390E+04	8.25508E+03	-2.84829E+03	-2.13893E+03	1.58771E+04
59	121	-1.54551E+03	4.00764E+04	3.67896E+03	-9.41926E+02	-8.90914E+01	1.13333E+04
59	122	-9.61155E+02	4.05276E+04	4.79614E+03	-1.61439E+03	-1.15975E+03	1.15903E+04
59	123	-9.06812E+02	3.98873E+04	5.23197E+03	-2.28919E+03	-2.25114E+03	1.18770E+04
59	131	-1.61387E+03	3.71690E+04	1.60816E+03	-7.16642E+02	-1.36341E+02	7.08933E+03
59	132	-1.07168E+03	3.72515E+04	2.83013E+03	-1.56698E+03	-1.28407E+03	7.65071E+03
59	133	-9.96250E+02	3.63870E+04	3.43826E+03	-2.42063E+03	-2.45296E+03	8.26420E+03
59	211	1.33077E+03	6.28655E+04	6.33372E+03	5.49438E+02	1.44137E+03	3.68230E+02
59	212	1.38598E+03	6.24981E+04	6.27708E+03	5.61832E+02	-2.98425E+02	2.19139E+02
59	213	8.62503E+02	6.08613E+04	5.56974E+03	5.63916E+02	-2.06547E+03	3.49961E+02
59	221	-6.28377E+02	5.35999E+04	2.40330E+03	4.02792E+02	1.30884E+03	3.95936E+02
59	222	-3.11836E+02	5.34399E+04	2.82870E+03	2.38618E+02	-4.35241E+02	2.90167E+02
59	223	-4.93387E+02	5.22009E+04	2.66402E+03	6.32576E+01	-2.20673E+02	4.70919E+02
59	231	-1.20839E+03	4.73750E+04	-2.08868E+02	2.31584E+02	1.07535E+03	4.15953E+02
59	232	-7.14738E+02	4.72241E+04	6.14170E+02	-1.04236E+02	-6.75112E+02	3.58163E+02
59	233	-6.48671E+02	4.61604E+04	9.17721E+02	-4.52028E+02	-2.44913E+03	5.92705E+02
59	311	6.94244E+02	4.34457E+04	6.09696E+03	2.25812E+03	-2.95487E+02	-1.30199E+04
59	312	9.51159E+02	4.29976E+04	6.45590E+03	2.85462E+03	-1.12508E+03	-1.36654E+04
59	313	1.01805E+03	4.21157E+04	6.6927E+03	3.42823E+03	-1.98477E+03	-2.37669E+04
59	321	-7.04075E+02	3.95973E+04	2.96176E+03	1.72707E+03	-4.60281E+01	-8.62205E+03
59	322	-4.26970E+02	3.87354E+04	3.55359E+03	2.20953E+03	-9.54667E+02	-9.43243E+03
59	323	-2.74764E+02	3.75981E+04	4.00042E+03	2.66844E+03	-1.89362E+03	-9.71277E+03
59	331	-1.04267E+03	3.82099E+04	1.00057E+03	1.52714E+03	4.15999E+01	-4.62449E+03
59	332	-8.05391E+02	3.67938E+04	1.76438E+03	1.87461E+03	-9.37836E+02	-5.58284E+03
59	333	-6.36001E+02	3.52410E+04	2.43699E+03	2.19789E+03	-1.94702E+03	-6.02318E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
60	111	5.81858E+02	1.73996E+03	1.12179E+04	-2.09094E+02	-4.95209E+02	9.22431E+02
60	112	1.49381E+02	1.71827E+03	8.09907E+03	-2.22638E+02	-4.15559E+02	1.49342E+02
60	113	7.63472E+02	5.03038E+02	4.57189E+03	-1.13449E+02	-3.36176E+02	-1.55609E+02
60	121	3.65335E+02	1.57593E+03	1.29947E+04	-1.29777E+02	-6.90134E+02	1.54928E+02
60	122	3.24614E+02	1.62195E+03	1.02991E+04	-3.96956E+02	4.09948E+02	8.15286E+02
60	123	-1.98058E+02	4.63907E+02	7.20110E+03	-5.40654E+02	-1.21819E+02	5.12737E+02
60	131	3.70045E+01	1.16038E+03	1.44028E+04	-1.08575E+02	-9.12830E+02	1.83458E+03
60	132	3.79982E+02	1.27290E+03	1.21072E+04	-6.30506E+02	-4.41477E+02	1.16323E+03
60	133	2.40273E+02	1.72235E+02	9.41458E+03	-1.02832E+03	4.32802E+01	8.91211E+02
60	211	-2.16985E+03	4.03642E+03	7.44278E+03	-1.685419E+02	-1.92779E+03	9.01150E+03
60	212	-2.32077E+03	3.57314E+03	6.37768E+03	-9.79035E+02	-1.74910E+03	7.43664E+03
60	213	-2.64867E+03	2.74353E+03	5.09008E+03	-1.63608E+03	-1.59144E+03	6.34050E+03
60	221	-1.33342E+03	7.89774E+03	8.77411E+03	1.43429E+02	-1.65460E+03	8.23262E+03
60	222	-1.46453E+03	6.9680E+03	7.73735E+03	-7.18902E+02	-1.43303E+03	6.83317E+03
60	231	-5.36390E+02	5.60715E+03	6.45978E+03	-1.50540E+03	-1.22657E+03	5.87989E+03
60	232	-6.31346E+02	9.98003E+03	8.95511E+03	3.28551E+02	-1.49627E+03	7.20685E+03
60	233	-9.50105E+02	8.13177E+03	7.70755E+03	-6.84365E+02	-1.22955E+03	6.00140E+03
60	311	-1.57843E+03	2.56529E+04	5.99434E+03	-1.47651E+03	-9.72776E+02	5.21333E+03
60	312	-2.20744E+03	2.33614E+04	5.82388E+03	-2.41359E+03	-2.12283E+03	1.53222E+04
60	321	-2.75681E+03	2.13651E+04	5.62623E+03	-3.31902E+03	-2.42276E+03	1.46410E+04
60	322	-6.85736E+02	3.00427E+04	6.40382E+03	-5.28664E+02	-1.42066E+03	1.29701E+04
60	323	-1.38730E+03	2.72386E+04	6.18272E+03	-1.58625E+03	-1.78635E+03	1.21313E+04
60	331	1.80822E+03	2.46283E+04	5.89714E+03	-2.60896E+03	-2.16055E+03	1.15788E+04
60	332	9.82041E+02	3.41158E+04	6.88706E+03	-3.55762E+01	-1.16149E+03	9.38507E+03
60	333	1.57895E+02	3.08439E+04	6.65060E+03	-1.20626E+03	-1.59652E+03	8.91067E+03
60	333	1.57895E+02	2.76773E+04	6.31719E+03	-2.33555E+03	-2.03604E+03	8.70540E+03
115	111	-4.03311E+02	6.44796E+03	7.97822E+02	-1.77191E+03	1.13090E+03	-4.06648E+03
115	112	-7.91925E+02	6.51225E+03	1.37866E+03	-8.80373E+02	-2.94922E+02	-4.75365E+03
115	113	-1.02813E+03	7.08064E+03	1.94340E+03	1.60381E+01	-4.41376E+02	-5.17869E+03
115	121	-2.93405E+02	7.39068E+03	1.21142E+03	-1.93637E+03	7.36967E+02	-2.82875E+03
115	122	-6.41802E+02	7.45170E+03	1.58898E+03	-1.01385E+03	-3.96098E+01	-3.52622E+03
115	123	-8.59449E+02	7.96852E+03	1.93067E+03	-2.91557E+01	-7.01059E+02	-3.95855E+03
115	131	-1.21986E+02	8.27130E+03	1.69628E+03	-2.18940E+03	3.09446E+02	-1.60329E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
115	132	-4.29950E+02	8.32926E+03	1.87618E+03	-1.12906E+03	-4.10115E+02	-2.31270E+03
115	133	-6.27875E+02	8.79735E+03	2.00130E+03	-5.40291E+01	-6.00090E+03	-2.75428E+03
115	211	-6.70695E+02	1.81223E+01	3.52895E+02	-2.87929E+02	6.59305E+02	-1.75184E+03
115	212	-1.32676E+03	-1.65660E+02	7.79063E+02	2.01053E+02	9.47216E+01	-1.99378E+03
115	213	-1.75483E+03	3.66278E+02	1.27106E+03	6.42725E+02	-4.70234E+02	-2.11825E+03
115	221	-5.78615E+02	8.68690E+02	8.01582E+02	-4.51394E+02	6.89056E+02	-1.39913E+03
115	222	-1.31130E+03	7.15006E+02	1.13773E+03	1.55784E+02	1.64950E+02	-1.69923E+03
115	223	-1.83314E+03	1.20064E+03	1.52479E+03	7.04586E+02	-3.36756E+02	-1.87693E+03
115	231	-4.64354E+02	1.65056E+03	1.26508E+03	-5.88195E+02	6.62525E+02	-9.86976E+02
115	232	-1.78289E+03	1.48514E+03	1.50022E+03	1.38491E+02	1.77610E+02	-1.38875E+03
115	233	-1.89783E+03	1.91691E+03	1.7181E+03	7.89355E+02	-2.64992E+02	-1.56547E+03
115	311	-4.11517E+02	-4.0224E+02	-3.83104E+01	-2.12433E+02	-3.94366E+02	6.8737E+02
115	312	-1.38685E+03	-4.47975E+02	-2.41114E+02	1.44195E+02	-4.60766E+02	5.75308E+02
115	313	-2.13294E+03	1.80913E+02	-3.51925E+02	2.99330E+02	-5.20629E+02	4.36252E+02
115	321	-6.78327E+02	-7.42115E+02	3.80053E+02	4.85786E+00	-1.63725E+02	4.67687E+02
115	322	-1.83892E+03	-8.30238E+02	2.11321E+02	4.69682E+02	-2.21814E+02	3.00072E+02
115	323	-2.78259E+03	-2.73997E+02	1.23921E+02	7.36970E+02	-2.49713E+02	1.11328E+02
115	331	-9.37570E+02	-1.13305E+03	7.49803E+02	2.29241E+02	-8.15331E+00	3.55640E+02
115	332	-2.29053E+03	-1.27695E+03	5.85718E+02	7.99199E+02	-5.68153E+01	1.39139E+02
115	333	-3.53852E+03	-8.05689E+02	4.92432E+02	1.17573E+03	-5.46075E+01	-9.36269E+01
116	111	5.08833E+02	2.27003E+04	3.67639E+03	-4.25393E+03	-1.96328E+03	7.87524E+03
116	112	4.68770E+02	2.40317E+04	4.26269E+03	-1.69719E+03	-6.30340E+02	8.71088E+03
116	113	-5.13507E+02	2.35129E+04	3.59047E+03	9.43882E+02	5.32322E+02	8.84161E+03
116	121	-4.07849E+02	1.92135E+04	1.40407E+03	-4.33132E+03	-1.49189E+03	4.97124E+03
116	122	-4.72636E+02	2.06998E+04	2.56705E+03	-1.93748E+03	-2.97003E+02	5.98970E+03
116	123	-1.35120E+03	2.06183E+04	2.61130E+03	5.69025E+02	7.33877E+02	6.35048E+03
116	131	-7.53354E+02	1.72799E+04	-1.46299E+02	-4.33673E+03	-9.27345E+02	2.34980E+03
116	132	-9.23204E+02	1.87598E+04	1.50528E+03	-2.09185E+03	1.34584E+02	3.51593E+03
116	133	-1.79118E+03	1.89240E+04	2.16304E+03	2.90934E+02	1.03708E+03	4.06620E+03
116	211	2.21493E+03	2.77721E+04	2.56200E+03	-5.59023E+03	-3.55615E+02	-9.90140E+02
116	212	2.17127E+03	2.93176E+04	2.74558E+03	-3.55634E+03	1.70704E+02	-2.64015E+02
116	213	1.19301E+03	2.88381E+04	1.87652E+03	-1.50809E+03	6.59329E+02	1.50438E+02
116	221	7.47492E+02	2.34981E+04	7.87042E+02	-5.21206E+03	-2.28443E+02	-1.63669E+03
116	222	7.34823E+02	2.50161E+04	1.27222E+03	-3.28693E+03	2.37694E+02	-7.81760E+02

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
116	223	-9.46836E+01	2.47861E+04	7.96990E+02	-1.32269E+03	6.64992E+02	-2.17558E+02
116	231	-1.58775E+02	2.06204E+04	-3.76571E+02	-4.86352E+03	-5.62430E+01	-2.23774E+03
116	232	-1.71818E+02	2.20394E+04	3.53763E+02	-3.10254E+03	3.49498E+02	-1.27647E+03
116	233	-8.98037E+02	2.19523E+04	2.26775E+02	-1.12602E+03	7.15289E+02	-5.87256E+02
116	311	7.19999E+02	1.58222E+04	1.31657E+03	-5.18024E+03	1.17170E+03	-5.36457E+03
116	312	1.03321E+03	1.77957E+04	2.18613E+03	-3.86493E+03	1.14725E+03	-5.89996E+03
116	313	9.18282E+02	1.87183E+04	2.68936E+03	-2.44911E+03	6.75314E+02	-6.28079E+03
116	321	1.92710E+02	1.49211E+04	9.35746E+02	-5.11006E+03	1.31028E+03	-4.04629E+03
116	322	3.66861E+02	1.63646E+04	1.51493E+03	-3.76800E+03	7.97092E+02	-4.48737E+03
116	323	1.87374E+02	1.69096E+04	1.77401E+03	-2.34797E+03	3.73165E+02	-4.78506E+03
116	331	1.08833E+02	1.49346E+04	9.84253E+02	-5.12537E+03	9.34336E+02	-2.85582E+03
116	332	1.62818E+02	1.58415E+04	1.31190E+03	-3.75699E+03	4.68637E+02	-3.22504E+03
116	333	-7.34594E+01	1.60477E+04	1.37258E+03	-2.29580E+03	8.47737E+01	-3.46030E+03
117	111	-2.52226E+03	-1.05805E+03	1.08456E+04	1.90458E+02	-3.03939E+02	1.70471E+03
117	112	-1.37349E+03	-7.30660E+02	9.39643E+03	3.73400E+02	-8.72248E+01	7.71349E+02
117	113	-1.06180E+03	-2.62348E+03	7.37143E+03	9.88029E+02	-4.88692E+01	4.03808E+02
117	121	-1.48743E+03	-5.98988E+02	1.18940E+04	-1.61299E+02	-5.53741E+02	1.57679E+03
117	122	-8.22170E+02	5.02188E+02	1.05875E+04	7.19588E+02	-3.87515E+02	6.82877E+02
117	123	-1.10244E+03	-8.43261E+02	8.56547E+03	-2.06438E+03	-3.72517E+02	2.40887E+02
117	131	-1.27283E+03	-6.96452E+02	1.24094E+04	-7.11858E+02	-7.16552E+02	1.31652E+03
117	132	-1.10831E+03	1.23033E+03	1.12924E+04	9.02040E+02	-5.87004E+02	4.85476E+02
117	133	-1.99556E+03	4.84243E+02	9.32540E+03	3.01336E+03	-5.84995E+02	6.95845E+00
117	211	-2.53952E+03	3.11270E+03	6.01893E+03	1.32055E+03	2.65047E+02	6.61406E+03
117	212	-2.44193E+03	2.72802E+03	5.26659E+03	1.73765E+02	8.79918E+02	5.50638E+03
117	213	-2.35296E+03	2.11760E+03	4.70977E+03	1.92650E+03	1.19582E+03	4.99080E+03
117	221	-8.15222E+02	5.76355E+03	7.12177E+03	-2.06874E+03	-2.56008E+02	5.85129E+03
117	222	-1.22097E+03	5.51967E+03	6.44766E+03	-2.39021E+02	2.65223E+02	4.76246E+03
117	223	-1.76727E+03	4.75824E+03	5.80511E+03	-2.78927E+03	5.12223E+02	4.15349E+03
117	231	3.51389E+02	7.98833E+03	7.89211E+03	-1.88495E+03	-5.92252E+02	4.99435E+03
117	232	-5.57017E+02	7.93227E+03	7.34950E+03	-6.06213E+02	-1.57423E+02	3.96599E+02
117	233	-1.72374E+03	7.09380E+03	6.69139E+03	1.90598E+03	2.44512E+01	3.27971E+03
117	311	-1.10182E+03	1.47618E+04	3.28310E+03	-2.14140E+03	-1.01630E+03	9.60036E+03
117	312	-2.8172E+03	1.30148E+04	2.53679E+03	-2.11651E+01	1.89615E+02	9.11945E+03
117	313	-3.06605E+03	1.21845E+04	2.22211E+03	2.47779E+03	1.11995E+03	8.74073E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
117	321	8.16155E+02	1.77966E+04	3.86278E+03	-3.48827E+03	-1.16942E+03	7.57200E+03
117	322	-6.30253E+02	1.59976E+04	3.49251E+03	-1.07605E+03	-5.63930E+01	7.22992E+03
117	323	-1.80998E+03	1.48212E+04	3.42341E+03	1.45578E+03	7.94181E+02	6.91364E+03
117	331	2.45905E+03	2.06090E+04	4.28218E+03	-4.32185E+03	-1.09590E+03	5.53326E+03
117	332	7.50506E+02	1.87798E+04	4.36000E+03	-1.89675E+03	-7.49159E+01	5.34571E+03
117	333	-8.00117E+02	1.73214E+04	4.59408E+03	6.77793E+02	6.94125E+02	5.11778E+03
118	111	-1.50281E+03	1.44258E+04	2.30700E+03	-2.49340E+03	1.09279E+03	-9.44769E+03
118	112	-2.74230E+03	1.26660E+04	1.62626E+03	7.47702E+01	-2.35350E+03	-8.91652E+03
118	113	-3.56185E+03	1.17956E+04	1.48272E+03	2.71524E+03	-1.30440E+03	-8.50634E+03
118	121	6.42413E+02	1.79931E+04	3.43792E+03	-1.23709E+03	1.23060E+03	-7.46975E+03
118	122	-8.97574E+02	1.61037E+04	3.01363E+03	-1.09913E+03	7.55242E-01	-7.10562E+03
118	123	-2.14462E+03	1.48098E+04	2.97935E+03	1.6167E+03	-9.84578E+02	-6.78701E+03
118	131	2.43203E+03	2.12692E+04	4.36420E+03	-4.66405E+03	1.15058E+03	-5.44966E+03
118	132	6.00313E+02	1.92772E+04	4.23886E+03	-2.00582E+03	1.73809E+01	-5.27222E+03
118	133	-1.04588E+03	1.76277E+04	4.37718E+03	7.86775E+02	-8.63172E+02	-5.07460E+03
118	211	-3.05384E+03	2.15925E+03	6.85343E+03	-1.38403E+03	-2.75768E+02	-6.5632E+03
118	212	-2.99380E+03	1.95213E+03	5.95445E+03	1.79058E+02	-9.55982E+02	-5.35085E+03
118	213	-2.93679E+03	1.48556E+03	5.30976E+03	1.98811E+03	-1.33990E+03	-4.73223E+03
118	221	-1.29000E+03	5.11003E+03	7.98716E+03	-2.19584E+03	1.57194E+02	-5.82563E+03
118	222	-1.73690E+03	4.98923E+03	7.14482E+03	-2.70333E+02	-4.32082E+02	-4.64780E+03
118	223	-2.31421E+03	4.31906E+03	6.39856E+03	1.93722E+03	-7.51662E+02	-3.95642E+03
118	231	-1.19994E+02	7.60008E+03	8.78133E+03	-2.97182E+03	4.11748E+02	-4.97279E+03
118	232	-1.07295E+03	7.61544E+03	8.04372E+03	-6.65033E+02	-9.37328E+01	-3.85679E+03
118	233	-2.27214E+03	6.81724E+03	7.25959E+03	1.95873E+03	-3.52436E+02	-3.13087E+03
118	311	3.94175E+00	1.28386E+03	1.76893E+04	1.69801E+02	-3.78915E+02	-2.73409E+02
118	312	7.45695E+02	1.29808E+03	1.52291E+04	3.59317E+02	-5.33816E+02	5.40038E+02
118	313	6.64691E+02	-9.05353E+02	1.22371E+04	9.77193E+02	-5.07038E+02	7.79999E+02
118	321	6.77191E+02	1.45448E+03	1.78664E+04	-1.89729E+02	-2.55939E+02	-2.38532E+02
118	322	9.98591E+02	2.28912E+03	1.56986E+04	7.05523E+02	-3.66402E+02	5.51387E+02
118	323	3.91382E+02	6.82392E+02	1.28656E+04	2.06141E+03	-3.24254E+02	8.79529E+02
118	331	5.70000E+02	1.10781E+03	1.76230E+04	-7.47430E+02	-2.10767E+02	-5.01511E+01
118	332	4.44039E+02	2.80596E+03	1.57696E+04	8.88758E+02	-2.88892E+02	6.88027E+02
118	333	-7.14429E+02	1.83661E+03	1.31217E+04	3.01912E+03	-2.39773E+02	1.06196E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
119	111	9.53032E+02	1.76469E+04	1.83978E+03	-5.59944E+03	-1.83214E+03	6.10290E+03
119	112	1.38773E+03	1.96309E+04	2.63206E+03	-4.17063E+03	-1.28694E+03	6.50451E+03
119	113	1.49278E+03	2.26375E+04	3.22620E+03	-2.68417E+03	-8.04985E+02	6.81736E+03
119	121	1.96223E+02	1.64052E+04	1.37120E+03	-5.51797E+03	-1.39144E+03	4.64410E+03
119	122	5.39327E+02	1.78247E+04	1.82017E+03	-4.12391E+03	-9.30508E+02	4.95033E+03
119	123	4.67231E+02	1.83340E+04	2.12179E+03	-2.65846E+03	-5.26459E+02	5.17555E+03
119	131	1.27593E+02	1.61812E+04	1.368117E+03	-5.52388E+03	-9.77963E+02	3.33103E+03
119	132	1.92965E+02	1.70544E+04	1.51703E+03	-5.15718E+03	-5.90840E+02	3.56127E+03
119	133	1.74555E+00	1.71611E+04	1.54873E+03	-2.67743E+03	-2.55152E+02	3.71731E+03
119	211	2.39687E+03	2.95485E+04	2.63279E+03	-1.27845E+03	4.05009E+02	1.18478E+03
119	212	2.34158E+03	3.09439E+04	2.75406E+03	-2.65522E+03	-1.86562E+02	3.87182E+02
119	213	1.43571E+03	3.03921E+04	1.99953E+03	-1.53747E+03	-7.34935E+02	-5.9869E+01
119	221	8.50951E+02	2.50466E+04	8.80731E+02	-5.39692E+03	2.74765E+02	1.88050E+03
119	222	8.00751E+02	2.64156E+04	1.21236E+03	-3.43174E+03	-2.69187E+02	9.24652E+02
119	223	4.36185E+00	2.60811E+04	7.71969E+02	-1.41843E+03	-7.69201E+02	3.02085E+02
119	231	1.13046E+02	2.20256E+04	-2.54262E+02	-5.09195E+03	1.09145E+02	5.53295E+03
119	232	1.95443E+02	2.32815E+04	2.50535E+02	-3.21803E+03	-3.87154E+02	1.43969E+02
119	233	-9.32204E+02	2.30474E+04	7.44381E+01	-1.27869E+03	-8.38641E+02	6.61180E+02
119	311	9.04567E+02	2.37599E+04	3.82143E+03	-4.13801E+03	1.92858E+03	-7.78032E+03
119	312	7.22427E+02	2.49157E+04	4.26124E+03	-1.56976E+03	5.63972E+02	-8.60514E+03
119	313	3.62198E+02	2.42289E+04	3.56340E+03	1.09123E+03	-6.55071E+02	-8.72052E+03
119	321	-5.05059E+01	2.03719E+04	1.59686E+03	-4.36155E+03	1.46015E+03	-4.69683E+03
119	322	-2.57169E+02	2.16709E+04	2.54539E+03	-1.91133E+03	2.25101E+02	-5.76496E+03
119	323	-1.25170E+03	2.13734E+04	2.48350E+03	6.54057E+02	-8.68966E+02	-6.16727E+03
119	331	-4.47825E+02	1.856819E+04	1.09041E+02	-4.49731E+03	9.12156E+02	-1.90217E+03
119	332	-7.64743E+02	1.98487E+04	1.47289E+03	-2.15029E+03	-1.98689E+02	-3.17837E+03
119	333	-1.76608E+03	1.97387E+04	1.93996E+03	3.31536E+02	-1.17175E+03	-3.82640E+03
120	111	-2.35404E+02	-2.75878E+02	5.31137E+02	-2.38184E+02	1.83371E+02	-5.89674E+02
120	112	-1.34396E+03	-4.39294E+02	-5.28674E+01	1.21442E+02	2.65025E+02	-4.60913E+02
120	113	-2.23269E+03	3.45225E+01	-5.38849E+02	2.73231E+02	3.29290E+02	-3.24710E+02
120	121	-5.06477E+02	-5.97208E+02	9.33956E+02	-2.07596E+01	-4.711163E+01	-3.63719E+02
120	122	-1.79860E+03	-8.00204E+02	3.99821E+02	4.43655E+02	2.68652E+01	-1.84138E+02
120	123	-2.87510E+03	-3.85542E+02	-3.06794E+01	7.046730E+02	6.29242E+02	5.32689E+00
120	131	-7.64922E+02	-9.66027E+02	1.30015E+03	2.04222E+02	-1.99807E+02	-2.50078E+02

ELEMENT	POINT	STRESS-XX	STRESS-VY	STRESS-ZZ	STRESS-XY	STRESS-YZ	STRESS-YZ
120	132	-2.24987E+03	-1.22412E+03	7.80990E+02	7.70416E+02	-1.35097E+02	-2.59674E+01
120	133	-3.52403E+03	-8.84314E+02	3.69204E+02	1.13787E+03	-1.26261E+02	2.10214E+02
120	211	-5.32144E+02	3.19824E+02	1.05532E+03	-4.33571E+02	-8.54667E+02	2.25506E+03
120	212	-1.17632E+03	1.86025E+02	1.25985E+03	8.83273E+01	-2.68191E+02	2.42335E+03
120	213	-1.63827E+03	5.74700E+02	1.53336E+03	5.37254E+02	3.17357E+02	2.46018E+03
120	221	-4.52363E+02	1.24625E+03	1.47230E+03	-5.92981E+02	-8.65923E+02	1.83739E+03
120	222	-1.19988E+03	1.08845E+03	1.57444E+03	2.94404E+01	-3.32338E+02	2.66601E+03
120	223	-1.76792E+03	1.43875E+03	1.75278E+03	5.70182E+02	1.80505E+02	2.16857E+03
120	231	-3.40369E+02	2.07993E+03	1.92457E+03	-7.23894E+02	-8.17103E+02	1.36118E+03
120	232	-1.19724E+03	1.88663E+03	1.90880E+03	-3.23467E+00	-3.34905E+02	1.64445E+03
120	233	-1.87826E+03	2.18644E+03	1.97438E+03	6.28396E+02	1.09173E+02	1.80649E+03
120	311	-3.52530E+02	7.41536E+03	1.25135E+03	-2.00088E+03	-1.28210E+03	4.80820E+03
120	312	-6.23540E+02	7.49007E+03	1.74765E+03	-1.07192E+03	-4.31066E+02	5.37406E+03
120	313	-7.66101E+02	7.89779E+03	2.31521E+03	-1.23035E+02	3.40609E+02	5.71083E+03
120	321	-2.55334E+02	8.35436E+03	1.66591E+03	-2.22851E+03	-8.44747E+02	3.43991E+03
120	322	-5.47546E+02	8.38432E+03	1.90507E+03	-1.22535E+03	-7.93912E+01	4.01680E+03
120	323	-7.15601E+02	8.73661E+03	2.21805E+03	-2.18625E+02	5.92905E+02	4.37160E+03
120	331	-8.15332E+01	9.25028E+03	2.17561E+03	-2.43444E+03	-3.68741E+02	2.09367E+03
120	332	-3.95690E+02	9.23311E+03	2.16019E+03	-1.35670E+03	3.13958E+02	2.68166E+03
120	333	-5.90740E+02	9.52292E+03	2.21966E+03	-2.29358E+02	8.91429E+02	3.05387E+03

APPENDIX F. INLET HEADER: 90% STEAM FLOW, 350 DEGREES I/C

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
55	111	-1.80040E+03	2.15096E+04	3.10531E+03	-1.40181E+03	1.74082E+03	-1.31415E+04
55	112	-1.98306E+03	1.94492E+04	2.95523E+03	-2.44516E+03	1.83545E+03	-1.24449E+04
55	113	-2.07564E+03	1.78496E+04	2.64696E+03	-3.51292E+03	1.88797E+03	-1.20093E+04
55	121	-8.86559E+01	2.65650E+04	3.60130E+03	-4.92418E+02	1.08228E+03	-9.84445E+03
55	122	-4.34707E+02	2.40620E+04	3.66840E+03	-1.63530E+03	1.14437E+03	-9.47588E+03
55	123	-7.74162E+02	2.18649E+04	3.45375E+03	-2.79333E+03	1.15757E+03	-9.31467E+03
55	131	1.47175E+03	3.11029E+04	3.98050E+03	-6.35315E+01	6.67498E+02	-6.45918E+03
55	132	9.87660E+02	2.82016E+04	4.30413E+03	-1.28898E+03	6.84173E+02	-6.43581E+03
55	133	4.37370E+02	2.54710E+04	4.23831E+03	-2.52150E+03	6.46075E+02	-6.57304E+03
55	211	-2.13648E+03	1.75617E+03	2.10759E+03	-2.99838E+01	1.95498E+03	-5.94390E+03
55	212	-1.82308E+03	1.58823E+03	1.49910E+03	-9.47956E+02	1.78597E+03	-4.94680E+03
55	213	-1.48950E+03	1.38687E+03	9.94473E+02	-1.86149E+03	1.62368E+03	-4.26024E+03
55	221	-1.16551E+03	6.14203E+03	4.00024E+03	3.64034E+02	1.26772E+03	-5.37975E+03
55	222	-9.47784E+02	5.46341E+03	3.41728E+03	-6.85888E+02	1.14710E+03	-4.51143E+03
55	223	-7.91631E+02	4.61998E+03	2.79339E+03	-1.70509E+03	1.02257E+03	-3.89387E+03
55	231	-4.20369E+02	9.97561E+03	5.54656E+03	5.05406E+02	7.44628E+02	-4.53545E+03
55	232	-2.70637E+02	8.83595E+03	5.03558E+03	-6.73157E+02	6.66655E+02	-3.81842E+03
55	233	-2.54732E+02	7.41270E+03	4.35310E+03	-1.81550E+03	5.75555E+02	-3.29922E+03
55	311	-1.85097E+03	-1.23484E+03	3.51498E+03	-7.34029E+01	-1.47232E+02	1.59698E+02
55	312	-1.60474E+03	-6.67561E+02	1.71558E+03	-1.74452E+02	7.37097E+01	5.93243E+02
55	313	-1.73942E+03	-1.13166E+03	-3.23140E+02	-1.78056E+02	3.01647E+02	9.43709E+02
55	321	-1.68270E+03	-8.65535E+02	6.22246E+03	-1.33404E+01	-3.10138E+02	-4.56327E+02
55	322	-1.19929E+03	-3.56737E+02	4.61896E+03	-5.36000E+02	-2.21376E+01	-4.55516E+01
55	323	-1.15417E+03	-9.47825E+02	2.65319E+03	-5.95032E+02	2.61624E+02	3.32613E+02
55	331	-1.72726E+03	-8.27823E+02	8.39323E+03	-1.42199E+01	-4.41114E+02	-7.31214E+02
55	332	-9.93339E+02	-5.57876E+02	7.01087E+03	-5.94753E+02	-7.71049E+01	-3.64774E+02
55	333	-7.47785E+02	-1.04761E+03	5.15870E+03	-1.07526E+03	2.72856E+02	9.40672E+00
56	111	-2.72820E+01	4.20913E+04	4.99478E+03	1.97462E+03	2.38646E+02	1.33543E+04
56	112	8.94016E+02	4.24025E+04	6.33594E+03	2.56178E+03	7.88581E+02	1.36825E+04
56	113	1.41142E+03	4.20347E+04	7.00351E+03	3.15080E+03	1.33608E+03	1.39437E+04
56	121	-1.18192E+03	3.79507E+04	2.36275E+03	1.56148E+03	1.49836E+02	8.86520E+03
56	122	-4.94541E+02	3.76691E+04	3.53207E+03	2.01463E+03	6.30935E+02	9.58873E+03
56	123	-1.33910E+02	3.68964E+04	4.09952E+03	2.46542E+03	1.10793E+03	9.86165E+03
56	131	-1.30994E+03	3.63369E+04	8.81959E+02	1.47883E+03	1.39433E+02	4.75989E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
56	132	-9.10028E+02	3.53217E+04	1.83865E+03	1.77690E+03	5.43127E+02	5.67726E+03
56	133	-7.70968E+02	3.39798E+04	2.25580E+03	2.0689E+03	9.41012E+02	6.15813E+03
56	211	1.31763E+03	6.12707E+04	6.36567E+03	3.90490E+00	-1.28173E+03	4.03820E+01
56	212	1.82935E+03	6.12380E+04	6.56633E+03	-5.82929E+00	1.73927E+02	-2.48728E-01
56	213	1.51563E+03	5.96534E+04	5.9588E+03	-1.47613E+01	1.59776E+03	-2.37545E+02
56	221	-6.92265E+02	5.20295E+04	2.48102E+03	1.01807E+01	-1.14228E+03	8.05601E+01
56	222	-1.02475E+02	5.20945E+04	3.12641E+03	-1.53867E+02	1.53660E+02	-1.05883E+01
56	223	-2.42478E+02	5.08340E+04	2.65623E+03	-3.22319E+02	1.41785E+03	-3.06728E+02
56	231	-1.44889E+03	4.57963E+04	-1.32655E+02	-2.40928E+01	-9.07646E+02	1.00640E+02
56	232	-8.66492E+02	4.57585E+04	8.01824E+02	3.9764E+02	2.28611E+02	-2.89171E+01
56	233	-9.30219E+02	4.45925E+04	7.04510E+02	-6.64134E+02	1.33317E+03	-3.70740E+02
56	311	6.88447E+01	4.32600E+04	6.23101E+03	-1.87590E+03	1.51948E+02	-1.40127E+04
56	312	1.06318E+03	4.39271E+04	7.36810E+03	-2.44781E+03	9.26382E+02	-1.43902E+04
56	313	1.27566E+03	4.32086E+04	7.27679E+03	-3.04214E+03	1.64408E+03	-1.46982E+04
56	321	-1.41105E+03	3.81431E+04	2.66260E+03	-1.23174E+03	-3.96886E+01	-9.42951E+03
56	322	-5.20971E+02	3.85545E+04	4.11145E+03	-1.96266E+03	6.40120E+02	-1.00813E+04
56	323	-3.26772E+02	3.77771E+04	4.42425E+03	-2.72045E+03	1.26514E+03	-1.06944E+04
56	331	-1.66760E+03	3.57395E+04	3.97427E+02	-9.97551E+02	-4.16618E+01	-5.27838E+03
56	332	-9.66523E+02	3.57004E+04	2.06913E+03	-1.86193E+03	5.32707E+02	-6.17692E+03
56	333	-8.86031E+02	3.46442E+04	2.68562E+03	-2.75700E+03	1.05399E+03	-7.06362E+03
57	111	-2.83733E+03	-2.42188E+03	2.10173E+03	4.73600E+02	-1.07248E+03	-1.07213E+03
57	112	-2.10623E+03	-2.01121E+03	8.40886E+02	3.16178E+02	-2.51995E+02	-1.33871E+03
57	113	-1.65045E+03	-2.22629E+03	-7.12503E+02	2.44635E+02	5.35913E+02	-1.41830E+03
57	121	-2.44941E+03	-2.34636E+03	4.71775E+03	5.76654E+02	-7.19440E+02	6.31923E+02
57	122	-1.92613E+03	-1.95641E+03	3.73977E+03	5.60729E+02	7.21859E+01	-1.36733E+02
57	123	-1.71035E+03	-2.26255E+03	1.69072E+03	6.31522E+02	8.39161E+02	-7.85173E+02
57	131	-2.20319E+03	-2.49791E+03	7.05207E+03	6.63344E+02	3.08666E+01	2.00885E+02
57	132	-1.91767E+03	-2.15670E+03	5.56051E+03	7.89679E+02	8.00722E+02	7.59881E+02
57	133	-1.96767E+03	-2.53164E+03	3.66704E+03	1.00354E+03	1.55279E+03	-4.27221E+02
57	211	-1.42368E+03	1.84787E+03	2.04970E+03	-1.10268E+02	1.47873E+03	4.29391E+03
57	212	-1.26878E+03	9.97232E+02	1.01228E+03	6.96466E+02	1.56616E+03	3.79727E+03
57	213	-7.88546E+02	8.66057E+02	2.04441E+02	1.53346E+03	1.60590E+03	3.47498E+03
57	221	-7.19574E+02	5.72467E+03	3.12823E+03	-1.91250E+02	8.78427E+02	4.26025E+03
57	222	-5.99835E+02	4.68595E+03	2.41331E+03	5.63662E+02	9.67935E+02	3.65826E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
57	223	-2.67086E+02	4.22528E+03	1.83048E+03	1.35307E+03	1.02124E+03	3.16171E+03
57	231	-2.20909E+02	9.12048E+03	4.10325E+03	-9.79595E+01	5.89389E+02	3.99029E+03
57	232	-1.86241E+02	7.88334E+03	3.62136E+03	6.01217E+02	6.76246E+02	3.28266E+03
57	233	-1.71137E+00	7.09898E+03	3.18648E+03	1.35861E+03	7.33435E+02	2.62034E+03
57	311	-1.78412E+03	1.96613E+04	2.04758E+03	1.11348E+03	1.60442E+03	1.15792E+04
57	312	-2.29378E+03	1.68754E+04	1.47670E+03	2.17346E+03	1.54721E+03	1.11999E+04
57	313	-2.29467E+03	1.54811E+04	1.21249E+03	3.22099E+03	1.47184E+03	1.06832E+04
57	321	-1.83767E+02	2.48616E+02	2.6428E+03	6.11683E+02	1.02027E+03	8.30272E+03
57	322	-7.04969E+02	2.18690E+04	2.35360E+03	1.48798E+03	9.33898E+02	8.29069E+03
57	323	-8.08307E+02	2.00325E+04	2.21262E+03	8.34290E+02	8.34290E+02	8.09044E+03
57	331	1.18067E+03	2.95171E+04	3.34445E+03	5.19838E+02	6.08231E+02	5.00543E+03
57	332	6.24923E+02	2.62724E+04	3.16189E+03	1.19505E+03	4.79763E+02	5.33556E+03
57	333	4.07696E+02	2.40532E+04	3.08576E+03	1.86955E+03	3.42337E+02	5.43304E+03
58	111	-1.60943E+03	2.06584E+04	3.90899E+03	8.15519E+02	-1.21304E+03	-1.29729E+04
58	112	-2.41950E+03	1.75024E+04	2.86383E+03	2.10134E+03	-1.43981E+03	-1.22259E+04
58	113	-2.45308E+03	1.59600E+04	2.79576E+03	3.35770E+03	-1.66744E+03	-1.13833E+04
58	121	-1.78889E+02	2.54788E+04	5.17726E+03	5.10056E+02	-9.23318E+02	-9.91688E+03
58	122	-1.05392E+03	2.20836E+04	4.02962E+03	1.55681E+03	-1.21859E+03	-9.41890E+03
58	123	-1.22783E+03	2.01257E+04	3.78532E+03	2.66183E+03	-1.52079E+03	-8.78691E+03
58	131	8.82298E+02	2.96481E+04	6.03919E+03	5.66060E+02	-7.63922E+02	-6.68455E+03
58	132	-2.03040E-01	2.60805E+04	4.91460E+03	1.44068E+03	-1.11817E+03	-6.48419E+03
58	133	-2.47320E+02	2.37966E+04	4.62828E+03	2.30041E+03	-1.48464E+03	-6.11630E+03
58	211	-2.50492E+03	1.83566E+03	6.84581E+03	-3.98085E+02	-1.10011E+03	-7.78584E+03
58	212	-2.44456E+03	1.09003E+03	5.40976E+03	3.94416E+02	-7.48494E+02	-6.25348E+03
58	213	-1.92676E+03	1.20297E+03	4.64136E+03	1.20407E+03	-3.58483E+02	-4.97273E+03
58	221	-1.55691E+03	5.86771E+03	8.79772E+03	-4.49105E+02	-1.21229E+03	-6.50769E+03
58	222	-1.78150E+03	4.70966E+03	7.04958E+03	2.93042E+02	-8.58273E+02	-9.36215E+03
58	223	-1.59938E+03	4.29078E+03	5.91922E+03	1.05758E+03	-4.75251E+02	-4.40918E+03
58	231	-9.66679E+02	2.26857E+03	1.02499E+04	-3.52418E+02	-1.20379E+02	-4.93318E+03
58	232	-1.41509E+03	7.77681E+03	8.31436E+03	3.36533E+02	-8.42535E+02	-4.20894E+03
58	233	-1.50110E+03	6.91991E+03	6.95316E+03	1.05252E+03	-4.64080E+02	-3.62534E+03
58	311	-2.54002E+03	3.26537E+03	1.78483E+04	4.41856E+02	-6.62760E+02	9.92243E+02
58	312	2.07609E+03	2.60258E+03	1.36906E+04	2.36967E+02	-1.48082E+02	1.36037E+03
58	313	1.51188E+03	1.48020E+03	9.65997E+03	1.18557E+02	4.00278E+02	1.38564E+03

ELEMENT	POINT	STRESS-XX	STRESS-VY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
58	321	1.81591E+03	2.22946E+03	1.78659E+04	5.28945E+02	-1.00814E+03	1.65152E+03
58	322	1.42520E+03	1.81977E+03	1.42724E+04	4.71108E+02	-3.69959E+02	1.48627E+03
58	323	9.23316E+02	9.23890E+02	1.07958E+04	4.96937E+02	2.91983E+02	1.04112E+03
58	331	8.98421E+02	9.06895E+02	1.74747E+04	5.94623E+02	-9.37784E+02	2.65037E+03
58	332	6.03957E+02	7.79758E+02	1.44924E+04	6.82346E+02	-1.81861E+02	1.92359E+03
58	333	1.88876E+02	1.43387E+02	1.16184E+04	5.89422E+02	5.89160E+02	9.71904E+02
59	111	-3.38421E+01	4.42129E+04	6.91351E+03	-1.49587E+03	-1.44251E+02	1.54891E+04
59	112	5.18846E+02	4.47793E+04	7.74977E+03	-1.93498E+03	-1.08017E+03	1.54035E+04
59	113	5.33126E+02	4.41747E+04	7.95509E+03	-2.37669E+03	-2.03363E+03	1.53197E+04
59	121	-1.51038E+03	3.86398E+04	3.62489E+03	-9.16765E+02	-5.61400E+01	1.09808E+04
59	122	-9.37832E+02	3.90277E+04	4.60428E+03	-1.56230E+03	-1.10180E+03	1.12084E+04
59	123	-8.34739E+02	3.84019E+04	5.02686E+03	-2.2118E+03	-2.16553E+03	1.14628E+04
59	131	-1.58627E+03	3.58241E+04	1.68280E+03	-7.06117E+02	-7.07563E+01	6.88016E+03
59	132	-1.07091E+03	3.58463E+04	2.73412E+03	-1.52957E+03	-1.21430E+03	7.40531E+03
59	133	-9.64613E+02	3.49922E+04	3.29348E+03	-2.35699E+03	-2.37611E+03	7.97885E+03
59	211	1.27889E+03	6.05892E+04	6.08165E+03	5.44808E+02	1.39828E+03	3.69211E+02
59	212	1.35793E+03	6.01851E+04	5.95899E+03	5.60333E+02	-2.68399E+02	2.19214E+02
59	213	9.35635E+02	5.86201E+04	5.31581E+03	5.64955E+02	-1.95825E+03	3.44924E+02
59	221	-6.11279E+02	5.16715E+04	2.35458E+03	4.01229E+02	1.30459E+03	4.00377E+02
59	222	-2.98702E+02	5.14555E+04	2.66778E+03	2.42578E+02	-3.91132E+02	2.91535E+02
59	223	-4.10910E+02	5.02594E+04	2.53724E+03	7.29364E+01	-2.11017E+03	4.65383E+02
59	231	-1.17755E+03	4.5806E+04	-1.04437E+02	2.34442E+02	1.11940E+03	4.23366E+02
59	232	-7.12736E+02	4.54615E+04	5.63306E+02	-9.31226E+01	-6.05471E+02	3.60463E+02
59	233	-6.05743E+02	4.44199E+04	8.54308E+02	-4.32294E+02	-2.35380E+03	5.86390E+02
59	311	6.80226E+02	4.18507E+04	5.89988E+03	2.19594E+03	-2.82555E+02	-1.25453E+04
59	312	9.45174E+02	4.13550E+04	6.14997E+03	2.76961E+03	-1.07401E+03	-1.31604E+04
59	313	1.08496E+03	4.05058E+04	6.33100E+03	3.32241E+03	-1.89076E+03	1.32352E+04
59	321	-6.75642E+02	3.81623E+04	2.62034E+03	1.69146E+03	-7.43512E+00	-8.29637E+03
59	322	-4.08955E+02	3.72569E+04	3.37271E+03	2.15547E+03	-9.01832E+02	-9.07409E+03
59	323	-2.05971E+02	3.61479E+04	3.81299E+03	2.59809E+03	-1.82141E+03	-9.32413E+03
59	331	-1.02031E+03	3.68388E+04	1.06846E+03	1.50521E+03	1.16767E+02	-4.43591E+03
59	332	-8.09949E+02	3.53882E+04	1.66426E+03	1.83949E+03	-8.72307E+02	-5.35753E+03
59	333	-6.09496E+02	3.38652E+04	2.29790E+03	2.15193E+03	-1.88645E+03	-5.76634E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
60	111	5.80475E+02	1.69215E+03	1.13859E+04	-2.16617E+02	-4.74749E+02	9.02691E+02
60	112	2.07852E+02	1.66440E+03	8.24886E+03	-2.23814E+02	-3.98660E+02	1.60077E+02
60	113	-6.26592E+02	4.90055E+02	4.17862E+03	-1.26966E+02	-3.18440E+02	-1.28164E+02
60	121	3.62661E+02	1.56343E+03	1.36652E+04	-1.48414E+02	-6.81708E+02	1.49419E+03
60	122	3.38231E+02	1.58050E+03	1.03294E+04	-4.02862E+02	-4.06856E+02	7.92036E+02
60	123	-1.45536E+02	4.44739E+02	7.21465E+03	-5.48629E+02	-1.22548E+02	5.10038E+02
60	131	3.66359E+01	1.19630E+03	1.43998E+04	-4.14000E+02	-9.13183E+02	1.75931E+03
60	132	3.51709E+02	1.25542E+03	1.20395E+04	-6.41832E+02	-4.49011E+02	1.11982E+03
60	133	2.09688E+02	1.56322E+02	9.31266E+03	-1.03346E+03	2.93021E+01	8.70508E+02
60	211	-2.07629E+03	3.96307E+03	7.50865E+03	-1.78819E+02	-1.81109E+03	8.79845E+03
60	212	-2.18785E+03	3.48817E+03	6.36129E+03	-9.65067E+02	-1.63316E+03	7.25483E+03
60	213	-2.46679E+03	2.65629E+03	5.05350E+03	-1.58501E+03	-1.47109E+03	6.16470E+03
60	221	-1.30045E+03	7.68021E+03	8.77959E+03	1.20361E+02	-1.55198E+03	8.02502E+03
60	222	-1.41502E+03	6.74171E+03	7.66592E+03	-7.14564E+02	-1.33990E+03	6.65692E+03
60	223	-1.71714E+03	5.38762E+03	6.34271E+03	-1.48013E+03	-1.13859E+03	5.71267E+03
60	231	-5.59914E+02	1.09885E+04	9.96619E+03	2.83712E+02	-1.39884E+03	7.01709E+03
60	232	-6.63050E+02	9.63007E+03	8.82057E+03	-6.98762E+02	-1.15065E+03	5.84154E+03
60	233	-9.71308E+02	7.79486E+03	7.51746E+03	-1.60923E+03	-9.08774E+02	5.06392E+03
60	311	-1.51206E+03	2.48468E+04	5.87083E+03	-1.43751E+03	-1.75643E+03	1.60145E+04
60	312	-2.09969E+03	2.25783E+04	5.62931E+03	-2.33290E+03	-2.02387E+03	1.48393E+04
60	313	-2.58840E+03	2.06050E+04	5.42477E+03	-3.19886E+03	-2.29998E+03	1.39497E+04
60	321	5.12974E+01	2.90784E+04	6.31375E+03	-5.29528E+02	-1.34162E+03	1.25910E+04
60	322	-6.61978E+02	2.63018E+04	5.99558E+03	-1.55008E+03	-1.70450E+03	1.17566E+04
60	323	-1.31313E+03	2.37271E+04	5.68456E+03	-2.55669E+03	-2.07284E+03	1.11911E+04
60	331	1.73574E+03	3.30113E+04	6.83366E+03	-6.30662E+01	-1.06951E+03	9.12595E+03
60	332	9.19442E+02	2.97686E+04	6.47148E+03	-1.19781E+03	-1.51951E+03	8.64709E+03
60	333	1.33201E+02	2.66464E+04	6.09043E+03	-2.29469E+03	-1.97219E+03	8.42273E+03
115	111	-3.99731E+02	6.03042E+03	7.91492E+02	-1.55787E+03	9.72110E+02	-3.84696E+03
115	112	-8.17622E+02	6.00980E+03	1.26744E+03	-6.78405E+02	1.54747E+02	-4.46418E+03
115	113	-1.06601E+03	6.50469E+03	1.77830E+03	-2.36459E+02	-5.91670E+02	-4.81703E+03
115	121	-3.12627E+02	6.86513E+03	1.22227E+03	-1.80690E+03	6.24999E+02	-2.69389E+03
115	122	-7.25020E+02	6.84730E+03	1.48567E+03	-8.22936E+02	-1.34341E+02	-3.32134E+03
115	123	-9.85621E+02	7.30035E+03	1.76785E+03	-1.73030E+02	-8.05886E+02	-3.68334E+03
115	131	-1.65558E+02	7.65331E+03	1.72540E+03	-2.03244E+03	2.41149E+02	-1.55601E+03

ELEHENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
115	132	-5.73697E+02	7.63547E+03	1.77912E+03	-9.43705E+02	-4.63088E+02	-2.19405E+03
115	133	-8.46255E+02	8.04611E+03	1.83593E+03	1.36364E+02	-1.06465E+03	-2.56571E+03
115	211	-5.86909E+02	1.74268E+01	5.43240E+02	-2.66365E+02	5.09966E+02	-1.71535E+03
115	212	-1.26770E+03	-1.61735E+02	8.21255E+02	2.82439E+02	-4.12169E+01	-1.91565E+03
115	213	-1.71108E+03	3.46363E+02	1.16884E+03	7.39824E+02	-6.17970E+02	-1.99450E+03
115	221	-5.38138E+02	7.95280E+02	9.16165E+02	4.12774E+02	5.62705E+02	-1.35844E+03
115	222	-1.34156E+03	6.10846E+02	1.09673E+03	-2.49934E+02	5.54257E+01	-1.61811E+03
115	223	-1.92251E+03	1.07650E+03	1.35640E+03	8.10535E+02	-4.45250E+02	-1.75395E+03
115	231	-4.56338E+02	1.49451E+03	1.32052E+03	-5.30288E+02	5.56174E+02	-9.50170E+02
115	232	-1.36708E+03	1.29341E+03	1.39019E+03	2.44342E+02	9.23897E+01	-1.26378E+03
115	233	-2.10986E+03	1.70686E+03	1.52843E+03	9.07887E+02	-3.52246E+02	-1.45024E+03
115	311	-3.67204E+02	-4.56121E+02	2.67883E+02	-2.16982E+02	-4.43370E+02	7.11689E+02
115	312	-1.34714E+03	-4.84846E+02	-6.88543E+01	1.97218E+02	-5.09080E+02	5.98321E+02
115	313	-2.09023E+03	1.75392E+02	-3.00564E+02	3.44930E+02	-5.76951E+02	4.55682E+02
115	321	-6.71129E+02	-7.91265E+02	5.41068E+02	1.93626E+01	-2.18067E+02	5.26814E+02
115	322	-1.90011E+03	-8.75225E+02	2.21854E+02	5.45167E+02	-2.70204E+02	3.57945E+02
115	323	-2.90293E+03	-2.99084E+02	2.57129E-01	8.10219E+02	-2.98549E+02	1.64410E+02
115	331	-9.47049E+02	-1.15749E+03	7.97530E+02	2.64317E+02	-6.58421E+01	4.37657E+02
115	332	-2.43092E+03	-1.31038E+03	4.64409E+02	8.98828E+02	-1.06810E+02	2.20160E+02
115	333	-3.69920E+03	-8.31234E+02	2.21881E+02	1.27844E+03	-9.73013E+01	-1.80061E+01
116	111	4.43567E+02	2.13750E+04	3.47673E+03	-3.95297E+03	-1.84937E+03	7.42817E+03
116	112	4.02166E+02	2.25776E+04	3.97538E+03	-1.46513E+03	-5.54157E+02	8.21154E+03
116	113	-5.10740E+02	2.20592E+04	3.31803E+03	1.10649E+03	5.62322E+02	8.31642E+03
116	121	-4.46812E+02	1.80642E+04	1.32413E+03	-4.03921E+03	-1.42195E+03	4.67870E+03
116	122	-5.21525E+02	1.94322E+04	2.39103E+03	-1.70421E+03	-2.55306E+02	5.64001E+03
116	123	-1.34681E+03	1.93453E+04	2.43497E+03	7.41962E+02	7.38330E+02	5.96826E+03
116	131	-8.07297E+02	1.62121E+04	-1.50408E+02	-4.05514E+03	-9.02108E+02	2.19754E+03
116	132	-9.93135E+02	1.75906E+04	1.39803E+03	-1.85965E+03	1.40888E+02	3.30226E+03
116	133	-1.81909E+03	1.77518E+04	2.04405E+03	4.71515E+02	1.01502E+03	3.81355E+03
116	211	2.00709E+03	2.60126E+04	2.30125E+03	-5.18796E+03	-3.11484E+02	-9.79817E+02
116	212	1.95077E+03	2.74048E+04	2.47807E+03	-3.18587E+03	1.82127E+02	-2.63891E+02
116	213	1.04208E+03	2.69252E+04	1.68169E+03	-1.17379E+03	6.19257E+02	6.19257E+02
116	221	6.30158E+02	2.20195E+04	6.98419E+02	-4.85584E+03	-1.92550E+02	-1.61012E+03
116	222	5.77567E+02	2.33844E+04	1.12249E+03	-2.95553E+03	2.45028E+02	-7.65780E+02

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
116	223	-2.16156E+02	2.31374E+04	6.98339E+02	-1.02049E+03	6.25223E+02	-2.02026E+02
116	231	-2.29933E+02	1.93301E+04	-3.59673E+02	-4.56433E+03	-3.09616E+01	-2.19571E+03
116	232	-3.07839E+02	2.06003E+04	2.89848E+02	-2.72715E+03	3.50556E+02	-1.24533E+03
116	233	-1.02945E+03	2.04853E+04	1.88096E+02	-8.51725E+02	6.73633E+02	-5.57509E+02
116	311	6.28345E+02	1.48022E+04	1.21541E+03	-4.84663E+03	1.60344E+03	-5.05927E+03
116	312	8.80238E+02	1.65808E+04	1.97240E+03	-3.50272E+03	1.03886E+03	-5.52031E+03
116	313	7.87089E+02	1.74166E+04	2.46555E+03	-2.11210E+03	5.46282E+02	-5.83289E+02
116	321	1.47281E+02	1.39922E+04	9.30585E+02	-4.81562E+03	1.24096E+03	-3.84628E+03
116	322	2.32570E+02	1.52395E+04	1.38674E+03	-3.46541E+03	7.30632E+02	-4.21290E+03
116	323	2.19738E+01	1.57199E+04	1.61699E+03	-2.05136E+03	2.84350E+02	-4.46100E+03
116	331	7.05768E+01	1.40274E+04	1.03377E+03	-4.85819E+03	9.03178E+02	-2.75115E+03
116	332	8.74400E+00	1.47740E+04	1.23193E+03	-3.48321E+03	4.38463E+02	-3.04541E+03
116	333	-2.90187E+02	1.49038E+04	1.24640E+03	-2.02977E+03	3.09185E+01	-3.20973E+03
117	111	-2.51280E+03	-1.11392E+03	1.12363E+04	1.75184E+02	-3.67930E+02	1.66120E+03
117	112	-1.27963E+03	-7.69399E+02	9.73064E+03	3.54631E+02	-1.38073E+02	7.76122E+02
117	113	-8.73789E+02	-2.62493E+03	7.66127E+03	9.92335E+02	-9.05956E+01	4.30625E+02
117	121	-1.49185E+03	-6.34590E+02	1.21067E+04	-1.48857E+02	-5.83436E+02	1.49866E+02
117	122	-7.90487E+02	4.74683E+02	1.07439E+04	7.22436E+02	-4.06752E+02	6.50718E+02
117	123	-1.02198E+03	-8.37808E+02	8.68248E+03	2.08617E+03	-3.83529E+02	-2.36180E+02
117	131	-1.27953E+03	-6.95238E+02	1.24775E+04	-6.74765E+02	-7.18146E+02	1.21841E+03
117	132	-1.13275E+03	1.22713E+03	1.12986E+04	9.23102E+02	-5.79940E+02	4.32265E+02
117	133	-2.02236E+03	5.05906E+02	9.29101E+03	3.04896E+03	-5.69949E+02	-1.66313E+01
117	211	-2.44565E+03	3.06919E+03	6.17532E+03	-1.29261E+03	1.71943E+02	6.46192E+03
117	212	-2.28147E+03	2.68164E+03	5.34993E+03	1.64292E+02	8.05870E+02	5.37732E+03
117	213	-2.13387E+03	2.03901E+03	4.72277E+03	1.89264E+03	1.133098E+03	4.86334E+03
117	221	-7.87904E+02	5.60332E+03	7.19320E+03	-1.98788E+03	-3.21834E+02	5.71556E+03
117	222	-1.15235E+03	5.36066E+03	6.44396E+03	-1.97472E+02	2.17546E+02	4.64527E+03
117	223	-1.66311E+03	4.57876E+03	5.73496E+03	1.90228E+03	4.74549E+02	4.03683E+03
117	231	3.19760E+02	7.72809E+03	7.89295E+03	-2.66418E+03	-6.38499E+02	4.88525E+03
117	232	-5.77120E+02	7.67266E+03	7.2027E+03	-5.21702E+02	-1.85122E+02	3.85047E+03
117	233	-1.73243E+03	6.82688E+03	6.54593E+03	1.96699E+03	8.64431E+00	3.18274E+03
117	311	-1.07204E+03	1.39974E+04	3.19828E+03	-2.27443E+03	-9.93269E+02	9.17682E+03
117	312	-2.18289E+03	1.22825E+04	2.40000E+03	6.54198E+01	2.03086E+02	8.68617E+03
117	313	-2.90417E+03	1.14420E+04	2.05206E+03	2.49444E+03	1.11684E+03	8.29511E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-YZ	STRESS-YZ
117	321	7.68213E+02	1.69229E+04	3.78774E+03	-3.29912E+03	-1.15904E+03	7.28419E+03
117	322	-6.23119E+02	1.51559E+04	3.37118E+03	-9.47499E+02	-5.13779E+01	6.92019E+03
117	323	-1.74961E+03	1.39776E+04	3.25972E+03	1.52781E+03	7.7990E+02	6.58156E+03
117	331	2.33991E+03	1.96308E+04	4.24868E+03	-1.10547E+03	-1.10547E+03	5.38079E+03
117	332	6.7764E+02	1.78359E+04	4.25001E+03	-1.72896E+03	-8.45665E+01	5.15932E+03
117	333	-8.40242E+02	1.63847E+04	4.43217E+03	7.94137E+02	6.79591E+02	4.98880E+03
118	111	-1.46691E+03	1.36648E+04	2.23004E+03	-2.35647E+03	1.07451E+03	-9.03138E+03
118	112	-2.63276E+03	1.19352E+04	1.49060E+03	1.47911E+02	-2.44144E+02	-8.48637E+03
118	113	-3.38505E+03	1.10491E+04	1.30901E+03	2.7552E+03	-1.29768E+03	-8.06065E+03
118	121	5.93691E+02	1.71227E+04	3.39515E+03	-3.52253E+03	1.22452E+03	-7.18796E+03
118	122	-8.85462E+02	1.52645E+04	2.89638E+03	9.73265E+02	-3.90380E-01	-6.79861E+03
118	123	-2.07376E+03	1.39643E+04	2.81359E+03	1.68443E+03	-9.75954E+02	-6.45533E+03
118	131	2.29890E+03	2.02939E+04	4.35128E+03	-4.44102E+03	1.16492E+03	-5.30195E+03
118	132	5.15798E+02	1.83362E+04	4.13586E+03	-1.8392E+03	3.09552E+01	-5.08801E+03
118	133	-1.08032E+03	1.66904E+04	4.21456E+03	9.00975E+02	-8.66590E+02	-4.85629E+03
118	211	-2.95441E+03	2.11976E+03	7.00841E+03	-1.35742E+03	-1.74812E+02	-6.41381E+03
118	212	-2.82590E+03	1.90822E+03	6.02885E+03	1.67841E+02	-8.75779E+02	-5.22110E+03
118	213	-2.70685E+03	1.40482E+03	5.30787E+03	1.95169E+03	-1.27126E+03	-4.60327E+03
118	221	-1.26218E+03	4.95237E+03	8.05792E+03	-2.11597E+03	2.29415E+02	-5.68871E+03
118	222	-1.66555E+03	4.83240E+03	7.11333E+03	-2.29578E+02	-3.79713E+02	-4.52961E+03
118	223	-2.20344E+03	4.13852E+03	6.31503E+03	6.31503E+03	-7.11697E+02	-3.83867E+03
118	231	-1.56299E+02	7.34088E+03	8.78272E+03	-2.84771E+03	4.63658E+02	-4.86161E+03
118	232	-1.0320E+03	7.36116E+03	7.95797E+03	-5.80629E+02	-6.21497E+01	-3.75991E+03
118	233	-2.27671E+03	6.55005E+03	7.10222E+03	2.02009E+03	-3.35257E+02	-3.03309E+03
118	311	5.66289E+00	1.22039E+03	1.80559E+04	1.54712E+02	-3.06428E+02	-2.28426E+02
118	312	8.32038E+02	1.25116E+03	1.55367E+04	3.40727E+02	-4.75943E+02	5.36582E+02
118	313	8.45811E+02	-9.15623E+02	1.24999E+04	9.81558E+02	-4.60194E+02	7.51261E+02
118	321	6.64304E+02	1.41123E+03	1.80561E+04	-1.77026E+02	-2.19294E+02	-1.58706E+02
118	322	1.02254E+03	2.25304E+03	1.58299E+04	7.08771E+02	-3.41360E+02	5.83128E+02
118	323	4.65483E+02	6.79967E+02	1.29575E+04	2.08362E+03	-3.09054E+02	8.82392E+02
118	331	5.54250E+02	1.10149E+03	1.76701E+04	-7.10067E+02	-2.03416E+02	4.98767E+01
118	332	4.11668E+02	2.79544E+03	1.57525E+04	9.10394E+02	-2.91075E+02	7.41071E+02
118	333	-7.47368E+02	1.85324E+03	1.30644E+04	3.05548E+03	-2.51323E+02	1.08380E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
119	111	8.69069E+02	1.66036E+04	1.74248E+03	-5.26893E+03	-1.71786E+03	5.80120E+03
119	112	1.24658E+03	1.84265E+04	2.41786E+03	-3.83049E+03	-1.17834E+03	6.12419E+03
119	113	1.31208E+03	1.92440E+04	3.00559E+03	-2.92485E+03	-6.75681E+02	6.36718E+03
119	121	2.49593E+02	1.54893E+04	1.36937E+03	-5.22711E+03	-1.31972E+03	4.44572E+03
119	122	4.06593E+02	1.67248E+04	1.68624E+03	-3.82490E+03	-8.6345E+02	4.67259E+03
119	123	3.10071E+02	1.71478E+04	1.95977E+03	-2.36590E+03	-4.38387E+02	4.82588E+03
119	131	8.00131E+01	1.52846E+04	1.44022E+03	-5.26041E+03	-9.42326E+02	3.22623E+03
119	132	3.09484E+01	1.59915E+04	1.42871E+03	-3.87317E+03	-5.59357E+02	3.37604E+03
119	133	-2.21638E+02	1.60173E+04	1.41163E+03	-2.41776E+03	-2.02600E+02	3.45804E+03
119	211	2.20302E+03	2.78167E+04	2.40487E+03	-5.32902E+03	3.6249E+02	1.17398E+03
119	212	2.13708E+03	2.90486E+04	2.74889E+03	-3.28048E+03	-1.96519E+02	3.17146E+02
119	213	1.31012E+03	2.84969E+04	1.80849E+03	-1.20748E+03	-6.8989E+02	-5.52537E+01
119	221	7.36032E+02	2.35893E+04	8.00226E+02	-5.04831E+03	2.42897E+02	1.85289E+03
119	222	6.47459E+02	2.47946E+04	1.05973E+03	-3.10748E+03	-2.71997E+02	9.07673E+02
119	223	-1.05668E+02	2.44408E+04	6.70556E+02	-1.12315E+03	-7.24570E+02	2.86298E+02
119	231	-1.92392E+02	2.07509E+04	-2.27767E+02	-4.78342E+03	9.05849E+01	2.48960E+03
119	232	-3.39075E+02	2.18471E+04	1.81808E+02	-2.98225E+03	-3.82137E+02	1.40670E+03
119	233	-1.06541E+03	2.15809E+04	2.68511E+01	-1.01303E+03	-7.91729E+02	6.29715E+02
119	311	8.49247E+02	2.24561E+04	3.62596E+03	-3.86327E+03	1.81954E+03	-7.33899E+03
119	312	6.69005E+02	2.34739E+04	3.97229E+03	-1.34448E+03	4.93506E+02	-8.10727E+03
119	313	-3.38416E+02	2.27853E+04	3.29118E+03	-1.24543E+03	-6.79322E+02	-8.19513E+03
119	321	-9.01551E+01	1.92375E+04	1.52401E+03	-4.07694E+03	1.39627E+03	-4.08444E+03
119	322	-3.03329E+02	2.40493E+04	2.36721E+03	-1.68558E+03	1.89702E+02	-5.41569E+03
119	323	-1.23658E+03	2.01024E+04	2.30275E+03	8.18794E+02	-8.67683E+02	-5.78357E+03
119	331	-5.13120E+02	1.75225E+04	1.14780E+02	-4.22459E+03	8.94931E+02	-1.75226E+03
119	332	-8.42259E+02	1.86797E+04	1.36392E+03	-1.92624E+03	-1.97408E+02	-2.96378E+03
119	333	-1.79476E+03	1.85615E+04	1.81232E+03	5.03982E+02	-1.14330E+03	-3.57172E+03
120	111	-1.90227E+02	-3.30197E+02	8.36145E+02	-2.39876E+02	2.59415E+02	-6.30183E+02
120	112	-1.30798E+03	-4.80019E+02	1.04260E+02	1.76508E+02	3.38793E+02	-4.94518E+02
120	113	-2.19702E+03	2.17196E+01	-5.13045E+02	3.19875E+02	4.08903E+02	-3.49833E+02
120	121	-5.00524E+02	-6.47844E+02	1.09198E+03	-3.89613E+00	3.08041E+01	-4.39824E+02
120	122	-1.86570E+03	-8.50061E+02	3.92639E+02	-5.20627E+02	9.78213E+01	-2.53444E+02
120	123	-3.00443E+03	-4.18474E+02	1.81858E+02	7.78424E+02	1.32824E+02	-5.42461E+01
120	131	-7.77466E+02	-9.92727E+02	1.34284E+03	2.41252E+02	-1.21488E+02	-3.49608E+02

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
120	132	-2.39815E+03	-1.26326E+03	6.39747E+02	8.71062E+02	-6.70008E+01	-1.19292E+02
120	133	-3.79555E+03	-9.18221E+02	6.92790E+01	1.24050E+03	-6.44130E+01	1.27217E+02
120	211	-4.47417E+02	3.52030E+02	1.24207E+03	-4.05636E+02	-6.90534E+02	2.21275E+03
120	212	-1.11662E+03	1.86889E+02	1.28470E+03	1.76247E+02	-1.19097E+02	2.33851E+03
120	213	-1.59451E+03	5.46447E+02	1.42447E+03	6.35200E+02	4.76257E+02	2.32896E+03
120	221	-4.14314E+02	1.17112E+03	1.58371E+03	-5.49436E+02	-7.26292E+02	1.79065E+03
120	222	-1.23321E+03	9.83063E+02	1.51643E+03	1.26257E+02	-2.11340E+02	1.97809E+03
120	223	-1.86072E+03	1.30944E+03	1.55682E+03	6.75832E+02	3.05635E+02	2.03775E+03
120	231	-3.37863E+02	1.91984E+03	1.97751E+03	-6.62169E+02	-7.00530E+02	1.32005E+03
120	232	-1.31268E+03	1.69539E+03	1.78206E+03	1.07740E+02	-2.39496E+02	1.56246E+03
120	233	-2.09725E+03	1.97396E+03	1.70608E+03	7.44725E+02	2.04363E+02	1.68380E+03
120	311	-3.46235E+02	6.99866E+03	1.24737E+03	-1.84124E+03	-1.12212E+03	4.59292E+03
120	312	-6.44531E+02	6.98390E+03	1.62710E+03	-8.70987E+02	-2.90837E+02	5.08182E+03
120	313	-7.94804E+02	7.30691E+03	2.13682E+03	9.85801E+01	4.90005E+02	5.34172E+03
120	321	-2.75192E+02	7.83680E+03	1.68300E+03	-2.07436E+03	-7.31028E+02	3.30935E+03
120	322	-6.30822E+02	7.78110E+03	1.79488E+03	-1.03757E+03	1.48560E+01	3.80906E+03
120	323	-8.39617E+02	8.05774E+03	2.04389E+03	-2.11212E+01	6.95239E+02	4.08914E+03
120	331	-1.29381E+02	8.64314E+03	2.21477E+03	-2.28062E+03	-2.97760E+02	2.05065E+03
120	332	-5.44303E+02	8.54483E+03	2.05831E+03	-1.17617E+03	3.66277E+02	2.55986E+03
120	333	-8.14657E+02	8.76819E+03	2.04411E+03	-1.09358E+02	9.51451E+02	2.85786E+03

APPENDIX G. OUTLET HEADER: 25% STEAM FLOW, 350 DEGREES

I/C

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
55	111	-2.04300E+03	2.99826E+04	4.55325E+03	-1.97138E+03	2.26451E+03	-1.79769E+04
55	112	-2.22035E+03	2.66551E+04	3.86265E+03	-3.36927E+03	2.34308E+03	-1.68405E+04
55	113	-2.10623E+03	2.41293E+04	3.27483E+03	-4.80784E+03	2.35098E+03	-1.59834E+04
55	121	3.10326E+02	3.71242E+04	5.47318E+03	7.23033E+02	1.21635E+03	-1.33551E+04
55	122	-1.89636E+02	3.31057E+04	4.89684E+03	-2.27354E+03	1.35393E+03	-1.27356E+04
55	123	-4.99364E+02	2.96992E+04	3.34750E+03	-3.85453E+03	1.41363E+03	-1.23317E+04
55	131	2.43094E+03	4.35467E+04	6.22974E+03	-1.58917E+02	4.66688E+02	-8.61053E+03
55	132	1.63611E+03	3.88855E+04	5.84565E+03	-1.83845E+03	6.45387E+02	-8.52910E+03
55	133	9.43300E+02	3.46711E+04	5.35964E+03	-3.53961E+03	7.40016E+02	-8.60572E+03
55	211	-2.56561E+03	2.53694E+03	3.33497E+03	-2.73875E+01	2.53482E+03	-8.05172E+03
55	212	-1.94905E+03	2.14642E+03	1.94881E+03	-1.28215E+03	2.29073E+03	-8.54451E+03
55	213	-1.18264E+03	1.89374E+03	9.26212E+02	-2.53281E+03	2.03661E+03	-5.36514E+03
55	221	-1.26002E+03	8.74386E+03	6.08279E+03	4.76341E+02	1.52521E+03	-7.22185E+03
55	222	-9.16190E+02	7.51446E+03	4.63119E+03	-9.44922E+02	1.41307E+03	-5.94118E+03
55	223	-5.21356E+02	6.26359E+03	3.36984E+03	-2.35516E+03	1.27949E+03	-4.91579E+03
55	231	-2.99651E+02	1.41787E+04	8.34755E+03	6.09520E+02	7.16690E+02	-6.00649E+03
55	232	-1.97558E+02	1.21669E+04	6.87649E+03	-9.74179E+02	7.29475E+02	-4.97997E+03
55	233	-1.31076E+02	9.99460E+03	5.44600E+03	-2.54078E+03	7.10888E+02	-4.14524E+03
55	311	-2.47006E+03	-1.65650E+03	5.62132E+03	-1.76389E+02	-3.36778E+02	3.68455E+02
55	312	-1.91556E+03	-9.53703E+02	2.55517E+03	-2.67535E+02	1.90327E+01	9.30435E+02
55	313	-1.76314E+03	-1.39968E+03	-7.43568E+02	-2.81930E+02	3.73513E+02	1.44211E+03
55	321	-2.17895E+03	-9.44948E+02	9.48850E+03	-1.56061E+02	-5.31744E+02	-4.72928E+02
55	322	-1.48863E+03	-5.01643E+02	6.58600E+03	-5.38276E+02	-5.74833E+01	5.71356E+01
55	323	-1.26769E+03	-1.28824E+03	3.34724E+03	-8.40286E+02	4.05407E+02	5.93484E+02
55	331	-2.22612E+03	-7.06703E+02	1.26055E+04	-2.48821E+02	-6.98101E+02	-8.35936E+02
55	332	-1.38853E+03	-5.02700E+02	9.90545E+03	-9.21782E+02	-8.90536E+01	-3.75559E+02
55	333	-1.07905E+03	-1.59937E+03	6.74344E+03	-1.51326E+03	4.98109E+02	1.43205E+02
56	111	4.38510E+02	5.89851E+04	7.30894E+03	2.91311E+03	2.66983E+02	1.85548E+04
56	112	1.92226E+03	5.89686E+04	8.75395E+03	3.77270E+03	9.94010E+02	1.91955E+04
56	113	3.14393E+03	5.83457E+04	9.91886E+03	4.64145E+03	1.69096E+03	1.90763E+04
56	121	-1.23636E+03	5.32266E+04	3.88359E+03	2.42854E+03	-2.21586E+01	1.21649E+04
56	122	-2.37815E+02	5.22616E+04	4.85096E+03	3.08063E+03	7.35592E+02	1.31388E+04
56	123	6.03861E+02	5.09548E+04	5.63655E+03	3.73757E+03	1.46174E+03	1.33759E+04
56	131	-1.52874E+03	5.10028E+04	2.05081E+03	2.41979E+03	-2.5606E+02	6.31640E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
56	132	-1.10143E+03	4.88785E+04	2.47645E+03	2.43601E+03	5.20905E+02	7.61985E+03
56	133	-7.35153E+02	4.66439E+04	2.80642E+03	2.80642E+03	1.26439E+03	8.20223E+03
56	211	2.27853E+03	8.56977E+04	9.15926E+03	7.00389E+01	-1.80926E+03	4.10495E+03
56	212	3.18224E+03	8.52065E+04	9.25604E+03	1.11015E+02	1.48786E+02	9.88935E+00
56	213	3.21807E+03	8.28465E+04	8.26913E+03	1.48381E+02	2.04429E+03	-3.27839E+02
56	221	-6.01444E+02	7.28109E+04	4.00567E+03	9.66421E+01	-1.78697E+03	5.84191E+01
56	222	2.74959E+02	7.23615E+04	4.39128E+03	-9.85882E+01	6.87950E+01	-3.49281E+01
56	223	4.17894E+02	7.03631E+04	3.82436E+03	-3.02648E+02	1.86209E+03	-4.48974E+02
56	231	-1.77560E+03	6.41308E+04	6.53032E+02	7.14995E+01	-1.68161E+03	4.67820E+01
56	232	-1.05125E+03	6.34292E+04	1.59249E+03	-3.52493E+02	7.19913E+01	-9.14407E+01
56	233	-9.42771E+02	6.14574E+04	8.70656E+02	-7.92544E+02	1.76317E+03	-5.62730E+02
56	311	5.44434E+02	6.03649E+04	8.97457E+03	-2.67781E+03	1.26493E+02	-1.93211E+04
56	312	2.05308E+03	6.08713E+04	1.01449E+04	-3.40569E+03	1.13810E+03	-1.97236E+04
56	313	2.70044E+03	5.96701E+04	1.01364E+04	-4.77236E+03	2.06330E+03	-1.99911E+04
56	321	-1.56130E+03	5.32937E+04	4.23844E+03	-1.84536E+03	-2.69797E+02	-1.28949E+04
56	322	-3.08396E+02	5.33434E+04	5.63977E+03	-2.81167E+03	7.23504E+02	-1.37204E+04
56	323	2.05441E+02	5.19646E+04	5.99520E+03	-3.02149E+03	1.63253E+03	-1.44566E+04
56	331	-1.98803E+03	5.00137E+04	1.31511E+03	-1.58527E+03	-4.51988E+02	-7.07745E+03
56	332	-1.11399E+03	4.93229E+04	2.81693E+03	-2.75383E+03	5.07684E+02	-8.28514E+03
56	333	-8.72057E+02	4.74476E+04	3.36931E+03	-3.96988E+03	1.38493E+03	-9.44339E+03
57	111	-4.17073E+03	-3.63110E+03	3.39474E+03	7.53201E+02	-1.80728E+03	-1.73799E+03
57	112	-2.64907E+03	-3.08161E+03	1.16933E+03	4.72663E+02	-5.24229E+02	-2.04904E+03
57	113	-1.44507E+03	-3.25175E+03	-1.39775E+03	4.43805E+02	6.88136E+02	-2.13372E+03
57	121	-3.43521E+03	-3.28101E+03	7.20974E+03	1.00269E+03	-1.23667E+03	7.90744E+02
57	122	-2.57338E+03	-2.88596E+03	4.72466E+03	9.02218E+02	2.21021E+01	-3.01722E+02
57	123	-2.05689E+03	-3.26053E+03	1.85714E+03	1.06574E+03	1.22950E+03	-1.25963E+03
57	131	-2.94593E+03	-3.25910E+03	1.06559E+04	1.20873E+03	-5.72646E+01	2.86938E+03
57	132	-2.79757E+03	-3.06369E+03	7.77548E+03	1.29940E+03	1.18828E+03	1.02714E+03
57	133	-3.01846E+03	-3.68111E+03	4.47788E+03	1.65599E+03	2.39919E+03	-7.60761E+02
57	211	-1.53589E+03	-2.88620E+03	3.36229E+03	-1.27290E+02	1.87398E+03	5.65644E+03
57	212	-9.85952E+02	1.42601E+03	1.27564E+03	1.00323E+03	2.05189E+03	4.92599E+03
57	213	9.83517E+01	1.18989E+03	-2.36924E+02	2.25422E+03	2.11578E+03	4.33107E+03
57	221	-5.42632E+02	8.44632E+03	4.87598E+03	-1.39579E+02	9.25576E+02	5.64627E+03
57	222	-3.12489E+02	6.62209E+03	3.17770E+03	9.08003E+02	1.17524E+03	4.76424E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
57	223	3.67119E+02	5.83779E+03	1.93771E+03	2.08642E+03	1.32917E+03	3.92771E+03
57	231	1.16061E+02	1.33276E+04	6.28922E+03	9.49859E+01	4.22132E+02	5.31471E+03
57	232	-2.75190E+01	1.11147E+04	4.80392E+03	4.80392E+03	7.34747E+02	4.27720E+03
57	233	2.04293E+02	9.78092E+03	3.69146E+03	2.15394E+03	9.67609E+02	3.20648E+03
57	311	-2.00636E+03	2.76603E+04	3.08133E+03	1.68711E+03	2.14395E+04	1.58952E+04
57	312	-2.57756E+03	2.31954E+04	1.66461E+03	3.19043E+03	2.04856E+03	1.52280E+04
57	313	-2.18149E+03	2.09950E+04	1.21258E+03	4.98858E+03	1.88867E+03	1.42325E+04
57	321	2.66815E+02	3.51946E+04	4.24149E+03	1.02864E+03	1.12774E+03	1.12590E+04
57	322	-4.96241E+02	3.02904E+04	2.97531E+03	2.26320E+03	1.10900E+03	1.11711E+04
57	323	-4.08959E+02	3.78377E+04	2.56870E+03	3.51781E+03	1.03780E+03	1.06923E+04
57	331	2.15209E+03	4.19437E+04	5.41137E+03	9.65756E+02	3.17116E+02	6.60355E+03
57	332	1.15634E+03	3.65855E+04	4.17222E+03	1.90695E+03	3.57007E+02	7.05203E+03
57	333	9.08971E+02	3.30000E+04	3.66378E+03	2.88171E+03	3.54893E+02	7.05488E+03
56	111	-1.73833E+03	2.92589E+04	6.04488E+03	1.18030E+03	-1.52557E+03	-1.81365E+04
56	112	-2.76484E+03	2.42724E+04	3.94956E+03	3.04075E+03	-1.83251E+03	-1.69060E+04
56	113	-2.43824E+03	2.18483E+04	3.80929E+03	4.86069E+03	-2.12761E+03	-1.54316E+04
56	121	1.61880E+02	3.61650E+04	8.12282E+03	8.36497E+02	-9.88088E+02	-1.38234E+04
56	122	-1.06580E+03	3.07327E+04	5.70006E+03	2.41638E+03	-1.52787E+03	-1.29881E+04
56	123	-1.03230E+03	2.76325E+04	5.15774E+03	3.97655E+03	-2.07096E+03	-1.18624E+04
56	131	1.49422E+03	4.21330E+04	9.58530E+03	1.01151E+03	-5.93207E+02	-9.24761E+03
56	132	1.51797E+02	3.63549E+04	7.02081E+03	2.9542E+03	-1.35275E+03	-8.87726E+03
56	133	-9.50712E+00	3.27100E+04	6.27200E+03	3.57512E+03	-2.12879E+03	-8.18279E+03
56	211	-2.99322E+03	3.06456E+03	1.10718E+04	-5.20194E+02	-1.29476E+03	-1.11844E+04
56	212	-2.63907E+03	1.72693E+03	8.40905E+03	6.38781E+02	-7.61634E+02	-8.84912E+03
56	213	-1.50253E+03	1.79387E+03	6.95302E+03	1.88313E+03	-1.30096E+02	-6.78263E+03
56	221	-1.79151E+03	8.80285E+03	1.38985E+04	-4.79446E+02	-1.45018E+03	-9.21639E+03
56	222	-2.07682E+03	6.75993E+03	1.06259E+04	5.99769E+02	-9.73411E+02	-7.49779E+03
56	223	-1.63105E+03	5.97560E+03	8.53520E+03	1.77739E+03	-4.21674E+02	-5.97378E+03
56	231	-1.14624E+03	1.38546E+04	1.59938E+04	-2.30775E+02	-1.37757E+03	-6.83145E+03
56	232	-1.98137E+03	1.10025E+04	1.22930E+04	7.65640E+02	-9.52048E+02	-5.78113E+03
56	233	-2.13022E+03	9.50143E+03	9.75240E+03	1.87195E+03	-4.72039E+02	-4.86015E+03
56	311	4.35544E+03	5.35677E+04	2.81629E+04	7.47291E+02	-9.83103E+02	1.50964E+03
56	312	4.02555E+03	4.22521E+03	2.14678E+04	4.10895E+02	-2.04534E+02	2.01008E+03
56	313	3.64447E+03	2.62334E+03	1.50767E+04	3.27340E+02	6.46650E+02	2.03430E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
58	321	3.29681E+03	3.95061E+03	2.79086E+04	9.63363E+02	-1.51374E+03	2.68621E+03
58	322	2.74823E+03	3.09195E+03	2.19431E+04	8.21074E+02	-5.66631E+02	2.34217E+03
58	323	2.15328E+03	1.74635E+03	1.63139E+04	9.34573E+02	4.68295E+02	1.60744E+03
58	331	1.91378E+03	2.12991E+03	1.70848E+04	1.13864E+03	-1.38432E+03	4.33317E+03
58	332	1.17723E+03	1.58407E+03	2.19105E+04	1.19186E+03	-2.40222E+02	3.10316E+03
58	333	3.98860E+02	5.37278E+02	1.71014E+04	1.50329E+03	9.3009E+02	1.55712E+03
59	111	3.07034E+02	6.16211E+04	1.00068E+04	-2.09135E+03	-1.41454E+02	2.16463E+04
59	112	1.12540E+03	6.20240E+04	1.07600E+04	-2.63642E+03	-1.61740E+03	2.13360E+04
59	113	1.42783E+03	6.10184E+04	1.11877E+04	-3.18860E+03	-2.72592E+03	2.10103E+04
59	121	-1.76350E+03	5.38931E+04	5.70189E+03	-1.34498E+03	8.21693E+01	1.53549E+04
59	122	-9.9024E+02	5.39657E+04	6.45517E+03	-2.19475E+03	1.48130E+03	1.55194E+04
59	123	-6.37706E+02	5.28442E+04	6.98690E+03	-3.05245E+03	-3.07781E+03	1.57051E+04
59	131	-1.85946E+03	5.00291E+04	3.28462E+03	-1.10943E+03	2.16839E+02	9.63398E+03
59	132	-1.24210E+03	4.94992E+04	3.93520E+03	-2.22376E+03	-1.61729E+03	1.02514E+04
59	133	-9.62795E+02	4.79626E+04	4.45536E+03	-3.34676E+03	-3.48492E+03	1.09219E+04
59	211	2.23947E+03	8.43748E+04	8.74690E+03	9.19381E+02	1.96789E+03	6.13498E+02
59	212	2.43816E+03	8.33201E+04	8.17401E+03	9.95454E+02	-3.05371E+02	3.37152E+02
59	213	2.24213E+03	8.09729E+04	7.55865E+03	1.05011E+03	-2.61801E+03	4.83312E+02
59	221	-4.88271E+02	7.20107E+04	3.81784E+03	7.16803E+02	2.01423E+03	7.13785E+02
59	222	-1.63284E+01	7.11732E+04	3.67916E+03	5.30902E+02	-4.44897E+02	4.83494E+02
59	223	1.64246E+02	6.92878E+04	3.60136E+03	3.24969E+02	-2.94366E+03	6.88387E+02
59	231	-1.37521E+03	6.37346E+04	6.51973E+02	4.89589E+02	1.97556E+03	8.0082E+02
59	232	-7.49038E+02	6.28328E+04	8.28245E+02	5.35296E+01	-6.69663E+02	6.24525E+02
59	233	-3.23768E+02	6.10965E+04	1.15587E+03	-4.05139E+02	-3.35480E+02	8.95348E+02
59	311	1.44574E+03	5.83912E+04	8.69999E+03	3.27502E+03	-3.89569E+02	-1.73354E+04
59	312	1.90681E+03	5.17577E+04	8.48596E+03	4.94161E+03	-1.48417E+03	-1.81203E+04
59	313	2.50623E+03	5.57816E+04	8.87182E+03	4.96161E+03	-2.61896E+03	-1.80505E+04
59	321	-5.87450E+02	5.33469E+04	8.72715E+03	2.62386E+03	1.87320E+02	-1.13143E+04
59	322	-1.61180E+02	5.14956E+04	4.67023E+03	3.32069E+03	-1.20222E+03	-1.23807E+04
59	323	4.86680E+02	4.97031E+04	5.28651E+03	3.97909E+03	-2.63201E+03	-1.26063E+04
59	331	-1.23634E+03	5.15967E+04	2.32090E+03	2.43508E+03	5.89448E+02	-5.83721E+03
59	332	-9.31321E+02	4.89224E+04	2.39288E+03	2.9361E+03	-1.08415E+03	-7.15779E+03
59	333	-3.33514E+02	4.64834E+04	3.07521E+03	3.40535E+03	-2.79807E+03	-7.64947E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
60	111	1.38552E+03	2.97427E+03	1.80229E+04	-4.11196E+02	-7.43855E+02	1.46111E+03
60	112	9.70124E+02	2.73206E+03	1.28609E+04	-3.69596E+02	-6.35642E+02	3.33392E+02
60	113	2.64350E+01	1.16133E+03	7.26653E+03	-2.32704E+02	-5.08948E+02	-1.06868E+02
60	121	1.05076E+03	2.89564E+03	2.02663E+04	-2.84356E+02	-1.10150E+03	2.20236E+03
60	122	9.48333E+02	2.55935E+03	1.56177E+04	-6.40099E+02	-6.95318E+02	1.19737E+03
60	123	3.41146E+02	9.08063E+02	1.06017E+04	-8.00282E+02	-2.67941E+02	7.82339E+02
60	131	5.42343E+02	2.48914E+03	2.20375E+04	-2.65907E+02	-1.48243E+03	2.55242E+03
60	132	7.30629E+02	2.04466E+03	1.78633E+04	-1.02089E+03	-7.94229E+02	1.64450E+03
60	133	4.34840E+02	2.97092E+02	1.33584E+04	-1.46008E+03	-8.24042E+01	1.30045E+03
60	211	-2.36148E+03	6.10482E+03	1.19177E+04	-4.45846E+02	-2.33092E+03	1.25678E+04
60	212	-2.43374E+03	5.21747E+03	9.77519E+03	-1.35573E+03	-2.06425E+03	1.02240E+04
60	213	-2.63859E+03	3.95511E+03	7.50094E+03	-2.19598E+03	-1.80024E+03	8.42244E+03
60	221	-1.43618E+03	1.12264E+04	1.36389E+04	6.13626E+01	-1.99516E+03	1.14282E+04
60	222	-1.61359E+03	9.57454E+03	1.14238E+04	-1.03908E+03	-1.72615E+03	9.35911E+03
60	223	-1.94735E+03	7.49944E+03	9.11169E+03	-2.06810E+03	-1.45702E+03	7.82575E+03
60	231	-5.28622E+02	1.58204E+04	1.51962E+04	2.23336E+02	-1.77620E+03	9.95489E+03
60	232	-8.19669E+02	1.34401E+04	1.29102E+04	-1.06823E+03	-1.50396E+03	8.19997E+03
60	233	-1.27031E+03	1.05947E+04	1.05575E+04	-2.28581E+03	-1.22923E+03	6.95772E+03
60	311	-1.61932E+03	3.52371E+04	8.88764E+03	-2.01012E+03	-2.28370E+03	2.24836E+04
60	312	-2.41044E+03	3.16433E+04	8.11961E+03	-3.17900E+03	-2.63137E+03	2.06196E+04
60	313	-2.92194E+03	2.85673E+04	7.77162E+03	-4.30414E+03	-2.98645E+03	1.90887E+04
60	321	4.79365E+02	4.10421E+04	9.65481E+03	-7.70157E+02	-1.64019E+03	1.76557E+04
60	322	-5.70973E+02	3.66517E+04	8.60161E+03	-2.13344E+03	-2.23850E+03	1.63210E+04
60	323	-1.37157E+03	3.26841E+04	7.96295E+03	-3.45024E+03	-2.84255E+03	1.53113E+04
60	331	2.78942E+03	4.64803E+04	1.05708E+04	-1.55454E+02	-1.14658E+03	1.27811E+04
60	332	1.50507E+03	4.13407E+04	9.26649E+03	-1.69863E+03	-1.98456E+03	1.19923E+04
60	333	4.44510E+02	3.65413E+04	8.37232E+03	-3.19300E+03	-2.82693E+03	1.15213E+04
115	111	-1.14980E+02	6.31849E+03	1.27318E+03	-1.02036E+03	1.18407E+02	-4.03843E+03
115	112	-1.12758E+03	5.66721E+03	1.12127E+03	-7.65730E+02	-1.05457E+03	-4.54944E+03
115	113	-1.60425E+03	6.10641E+03	1.61727E+03	2.43509E+03	-2.31399E+03	-4.59100E+03
115	121	-2.43854E+02	6.88761E+03	2.07790E+03	-1.51736E+03	-8.30677E+01	-2.79530E+03
115	122	-1.50451E+03	6.31881E+03	1.48337E+03	-1.45014E+02	-1.14402E+03	-3.32301E+03
115	123	-2.24490E+03	6.78897E+03	1.53791E+03	2.19065E+03	-2.25566E+03	-3.39620E+03
115	131	-2.75532E+02	7.48888E+03	3.00904E+03	-1.92623E+03	-3.80727E+02	-1.59426E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
115	132	-1.79771E+03	6.96740E+03	1.95006E+03	1.56834E+02	-1.33769E+03	-2.12735E+03
115	133	-2.81602E+03	7.43585E+03	1.53865E+03	1.53865E+03	-2.31375E+03	-2.21946E+03
115	211	-1.53680E+02	2.32081E+02	1.55177E+03	-1.00544E+02	-5.35648E+02	-1.85703E+03
115	212	-1.32856E+03	-3.39380E+02	8.51559E+02	1.26408E+03	-1.33279E+03	-1.91060E+03
115	213	-2.24915E+03	4.42588E+02	6.51174E+02	2.16425E+03	-2.33392E+03	-1.72570E+03
115	221	-1.60456E+02	6.89253E+02	1.66111E+03	-2.10001E+02	-2.35367E+02	-1.31103E+03
115	222	-2.16527E+03	1.32256E+02	7.73231E+02	1.32932E+03	-9.26035E+02	-1.47499E+03
115	231	-3.61684E+03	8.87204E+02	3.69444E+02	2.39090E+03	-1.76762E+03	-1.40950E+03
115	233	-3.47256E+02	1.16268E+03	1.99009E+03	-2.148892E+02	-4.78957E+01	-1.60950E+03
115	232	-2.88614E+03	5.83281E+02	7.99629E+02	1.46565E+03	-6.42896E+02	-1.00104E+02
115	233	-4.88146E+03	1.27402E+03	1.40692E+02	2.62531E+03	-1.36237E+03	-1.03592E+03
115	311	2.77338E+02	-6.41519E+02	1.37465E+03	-4.07590E+02	-1.27066E+03	1.48900E+03
115	312	-1.60423E+03	-6.69685E+02	-7.47285E+01	7.23956E+02	-1.37416E+03	1.29121E+03
115	313	-2.95245E+03	7.01521E+02	-1.11748E+03	9.78617E+02	-1.52453E+03	1.02264E+03
115	321	-5.70274E+02	-1.26139E+03	9.35601E+02	1.70944E+02	-9.15421E+02	1.39061E+03
115	322	-3.30424E+03	-1.48140E+03	-6.23598E+02	1.52137E+03	-9.57958E+02	1.10531E+03
115	323	-5.51014E+03	-3.41647E+02	-1.75442E+03	2.01674E+03	-9.91787E+02	7.49268E+02
115	331	-1.24499E+03	-1.80921E+03	6.52490E+02	7.73494E+02	-6.73282E+02	1.36933E+03
115	332	-4.83374E+03	-2.24743E+03	-1.07816E+03	2.33859E+03	-6.65014E+02	1.01204E+03
115	333	-7.90124E+03	-1.36614E+03	-2.36386E+03	3.07028E+03	-5.99513E+02	5.83977E+02
116	111	7.62675E+02	2.55176E+04	4.63710E+03	-4.15301E+03	-2.17756E+03	8.75398E+03
116	112	7.32529E+02	2.64720E+04	4.78444E+03	-5.97450E+02	-3.26378E+02	9.61367E+03
116	113	-1.62123E+02	2.56308E+04	3.84111E+03	3.08094E+03	1.16306E+03	9.63408E+03
116	121	-6.28570E+02	2.12706E+04	1.92012E+03	-4.35429E+03	-1.82372E+03	5.36121E+03
116	122	-8.30235E+02	2.25520E+04	2.87775E+03	-9.74923E+02	-1.02031E+02	6.48694E+03
116	123	-1.69496E+03	2.23503E+04	2.91262E+03	2.56588E+03	1.26225E+03	6.81155E+03
116	131	-1.42602E+03	1.87399E+04	4.29454E+00	-4.45446E+03	-1.33128E+03	-2.32267E+03
116	132	-1.84902E+03	2.01519E+04	1.652808E+03	-1.23259E+03	2.66826E+02	3.64202E+03
116	133	-2.85713E+03	2.03551E+04	2.52813E+03	2.18597E+03	1.51302E+03	4.21100E+03
116	211	2.31504E+03	2.96579E+04	2.59057E+03	-5.34605E+03	-2.36570E+02	-1.68999E+03
116	212	2.13855E+03	3.08356E+04	2.52686E+03	-2.24936E+03	3.26569E+02	-4.23749E+02
116	213	1.25023E+03	3.02064E+04	1.89094E+03	8.27432E+02	6.55195E+02	2.52607E+02
116	221	5.77910E+02	2.51235E+04	9.70324E+02	-5.17842E+03	-1.35004E+02	-2.38522E+03
116	222	1.69736E+02	2.62178E+04	1.09425E+03	-2.18640E+03	3.94545E+02	-1.12882E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
116	223	-8.20791E+02	2.57947E+04	7.69577E+02	8.20768E+02	6.88733E+02	-2.10261E+02
116	231	-6.09623E+02	2.20559E+04	-4.70153E+01	-4.99000E+03	1.27456E+01	-3.23582E+03
116	232	-2.27755E+03	2.29964E+04	2.34641E+02	-1.20767E+03	5.08510E+02	-1.80442E+03
116	233	-2.41171E+03	2.26709E+04	1.74896E+02	8.82951E+02	7.67868E+02	-6.86113E+02
116	311	8.50443E+02	1.64132E+04	1.40902E+03	-5.17866E+03	1.57133E+03	-5.55197E+03
116	312	7.85019E+02	1.79189E+04	1.81789E+03	-2.84069E+03	7.01044E+02	-5.84729E+03
116	313	6.90103E+02	1.88438E+04	2.66693E+03	-5.36274E+02	-2.44691E+02	-5.89895E+03
116	321	3.16241E+02	1.58162E+04	1.63986E+03	-5.46872E+03	1.29101E+03	-4.36347E+03
116	322	-2.58692E+02	1.65552E+04	1.39600E+03	-3.10231E+03	5.24836E+02	-4.48751E+03
116	323	-7.94786E+02	1.68960E+04	1.32288E+03	-7.43600E+02	-3.25059E+02	-4.37478E+03
116	331	1.78252E+02	1.60986E+04	2.26206E+03	-5.78035E+03	9.97333E+02	-2.29327E+03
116	332	-8.66100E+02	1.61340E+04	1.42631E+03	-3.36374E+03	3.24094E+02	-3.28164E+03
116	333	-1.81438E+03	1.59250E+04	1.11066E+03	-9.32102E+02	-4.39836E+02	-3.03978E+03
117	111	-3.56051E+03	-1.69537E+03	1.86747E+04	1.80742E+02	-9.72786E+02	2.38764E+03
117	112	-1.11123E+03	-1.15383E+03	1.59714E+04	4.59174E+02	-5.32729E+02	1.22638E+03
117	113	1.57407E+02	-3.85443E+03	1.25492E+04	1.64151E+03	-3.99564E+02	7.76943E+02
117	121	-1.99812E+03	-8.03328E+02	1.91471E+04	-1.35973E+02	-1.14789E+03	1.94629E+03
117	122	-7.17148E+02	8.83885E+02	1.66587E+04	1.18694E+03	-8.02883E+02	8.40261E+02
117	123	-7.63280E+02	-9.86027E+02	1.32692E+04	3.46807E+03	-7.09029E+02	2.99440E+02
117	131	-1.66526E+03	-6.82477E+02	1.89998E+04	-7.93997E+02	-1.23061E+03	1.40514E+03
117	132	-1.62565E+03	2.20373E+03	1.67535E+04	1.62541E+03	-9.51526E+02	3.85578E+02
117	133	-3.05681E+03	1.21671E+03	1.34291E+04	5.00528E+03	-8.74936E+02	-1.96894E+02
117	211	-2.85228E+03	4.83416E+03	1.02282E+04	-1.76889E+03	-2.19675E+02	8.93440E+03
117	212	-2.15594E+03	4.12764E+03	8.37524E+03	2.93139E+02	9.41284E+02	7.32324E+03
117	213	-1.51023E+03	2.85303E+03	6.90899E+03	2.88236E+03	1.55184E+03	6.47669E+03
117	221	-6.54154E+02	8.09582E+03	1.13783E+04	-2.53167E+03	-8.52573E+02	7.96623E+03
117	222	-9.75876E+02	7.66282E+03	9.63256E+03	4.24086E+01	1.57927E+02	4.28678E+03
117	223	-1.52078E+03	6.26757E+03	8.06807E+03	3.21658E+03	6.69243E+02	5.28534E+03
117	231	7.18221E+02	1.07992E+04	1.20987E+04	-3.32520E+03	-1.25596E+03	6.80240E+03
117	232	-6.42023E+02	1.07048E+04	1.05257E+04	-2.05266E+02	-3.73120E+02	5.20525E+03
117	233	-2.37993E+03	9.28731E+03	8.93678E+03	3.58575E+03	5.47707E+01	4.09769E+03
117	311	-1.00962E+03	1.74501E+04	4.88559E+03	-2.57739E+03	-1.41555E+03	1.16412E+04
117	312	-2.26068E+03	1.48890E+04	3.16345E+03	7.26449E+02	4.71674E+02	1.07486E+04
117	313	-2.93545E+03	1.34080E+04	2.29151E+03	4.19849E+03	1.85714E+03	1.00178E+04

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
117	321	1.31505E+03	2.1361E+04	5.93793E+03	-3.86424E+03	-1.78069E+03	9.51205E+03
117	322	-4.79976E+02	1.87362E+04	4.73396E+03	-5.27271E+02	9.0609E-01	8.74221E+03
117	323	-1.86707E+03	1.68126E+04	4.18648E+03	3.04479E+03	1.30990E+03	8.03188E+03
117	331	3.22160E+03	2.49208E+04	6.71802E+03	-4.88750E+03	-1.85063E+03	7.36022E+03
117	332	8.92237E+02	2.23128E+04	6.13320E+03	-1.50071E+03	-1.63501E+02	6.73862E+03
117	333	-1.17166E+03	2.00509E+04	5.99140E+03	2.18289E+03	1.07512E+03	6.08654E+03
118	111	-1.66958E+03	1.68725E+04	3.28635E+03	-2.66774E+03	1.48791E+03	-1.13297E+04
118	112	-3.02512E+03	1.43361E+04	1.75516E+03	9.16614E+02	-5.83188E+02	-1.04005E+04
118	113	-3.78306E+03	1.28463E+04	1.19627E+03	4.63254E+03	-2.19282E+03	-9.66390E+03
118	121	1.00717E+03	2.15781E+04	5.18955E+03	-4.18566E+03	1.83249E+03	-9.27666E+03
118	122	-9.23950E+02	1.88655E+04	3.96295E+03	-5.22088E+02	-1.15390E+02	-8.51414E+03
118	123	-2.41943E+03	1.68035E+04	3.51362E+03	3.36017E+03	-1.63476E+03	-7.84287E+03
118	131	3.13898E+03	2.58618E+04	6.74227E+03	-5.39996E+03	1.89396E+03	-7.15137E+03
118	132	6.55663E+02	2.30326E+04	5.88751E+03	-1.63784E+03	5.67303E+01	-6.58763E+03
118	133	-1.53375E+03	2.05103E+04	5.6329E+03	2.38419E+03	-1.37914E+03	-6.02590E+03
118	211	-3.68569E+03	3.32454E+03	1.15361E+04	-1.89473E+03	1.33156E+02	-8.86461E+03
118	212	-3.05619E+03	2.91505E+03	9.53076E+03	3.28510E+02	-1.11863E+03	-7.09698E+03
118	213	-2.46710E+03	1.89978E+03	7.98571E+03	3.00377E+03	-1.82688E+03	-6.11011E+03
118	221	-1.42330E+03	7.05357E+03	1.27240E+04	-2.71731E+03	6.42704E+02	-7.86916E+03
118	222	-1.80339E+03	6.82582E+03	1.07919E+04	2.11547E+01	-4.58008E+02	-6.12241E+03
118	223	-2.39437E+03	5.59854E+03	9.11343E+03	3.31221E+03	-1.07093E+03	-5.01149E+03
118	231	-4.17150E+01	1.01728E+04	1.36703E+04	-3.59907E+03	9.30178E+02	-6.76996E+03
118	232	-1.44973E+03	1.01972E+04	1.16644E+04	-2.83329E+02	-4.16675E+01	-5.07917E+03
118	233	-3.22181E+03	8.86029E+03	9.32478E+03	3.67413E+03	-5.73961E+02	-3.89700E+03
118	311	4.22517E+02	2.00667E+03	2.95086E+04	1.48061E+02	-1.77086E+02	-2.07107E+02
118	312	2.34033E+03	2.05923E+03	2.252425E+04	4.37985E+02	-5.10988E+02	7.82232E+02
118	313	2.68393E+03	-1.12327E+03	2.03166E+04	1.62407E+03	-5.29517E+02	3.04078E+03
118	321	1.42325E+03	2.44995E+03	2.86196E+04	-1.81922E+02	-1.85959E+02	9.03972E+01
118	322	2.16657E+03	3.71975E+03	2.47982E+04	1.16401E+03	-4.34239E+02	1.04785E+03
118	323	1.60659E+03	1.43999E+03	2.01405E+04	3.47333E+03	-4.27693E+02	1.61911E+03
118	331	1.25562E+03	2.18459E+03	2.72850E+04	-8.51387E+02	-2.74792E+02	5.20919E+02
118	332	8.43337E+02	4.70978E+03	2.36972E+04	1.60270E+03	-4.63647E+02	1.40755E+03
118	333	-1.01583E+03	3.37115E+03	1.95013E+04	5.08965E+03	-4.50511E+02	1.83435E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
119	111	1.17088E+03	1.91288E+04	2.18523E+03	-5.581647E+03	-1.76528E+03	6.7025E+03
119	112	1.2768E+03	2.06875E+04	2.52868E+03	-3.38065E+03	-9.22252E+02	6.78328E+03
119	113	1.38792E+03	2.15816E+04	3.48642E+03	-9.31834E+02	2.36022E+01	6.74032E+03
119	121	4.52627E+02	1.80209E+04	2.27819E+03	-6.08181E+03	-1.44177E+03	5.27104E+03
119	122	1.10887E+01	1.88008E+04	1.90667E+03	-3.65182E+03	-7.33916E+02	5.22039E+03
119	123	-3.74162E+02	1.90744E+04	2.18345E+03	-1.22784E+03	8.17789E+01	5.01630E+03
119	131	1.98895E+02	1.79482E+04	2.83632E+03	-6.37699E+03	-1.10118E+03	4.01633E+03
119	132	-7.62326E+02	1.79917E+04	1.80550E+03	-3.94512E+03	-5.15368E+02	3.83236E+03
119	133	-1.61942E+03	1.76630E+04	1.44770E+03	-1.50222E+03	1.82353E+02	3.49802E+03
119	211	2.54364E+03	3.22050E+04	2.69275E+03	-5.56004E+03	3.00252E+02	1.77324E+03
119	212	2.33687E+03	3.32158E+04	2.55398E+03	-2.33508E+03	3.57742E+02	6.15739E+02
119	213	1.48874E+03	3.24537E+04	2.03780E+03	8.09190E+02	-7.99671E+02	-1.12987E+02
119	221	7.04527E+02	2.73475E+04	1.05705E+03	-5.41369E+03	1.77005E+02	2.76760E+03
119	222	2.69084E+02	2.82923E+04	1.02821E+03	-2.36669E+03	-4.55993E+02	1.35738E+03
119	223	-6.96393E+02	2.77153E+04	7.29246E+02	7.10837E+02	-8.72385E+02	3.44286E+02
119	231	-5.51956E+02	2.40855E+04	7.24475E+01	-5.29029E+03	2.11354E+01	3.69882E+03
119	232	-1.25640E+03	2.48676E+04	1.12183E+02	-2.32333E+03	-5.86653E+02	2.06931E+03
119	233	-2.39496E+03	2.43465E+04	-2.45825E+01	6.96995E+02	-9.77137E+02	8.09995E+02
119	311	1.33304E+03	2.69625E+04	4.81061E+03	-3.92073E+03	2.08594E+03	-8.52944E+03
119	312	1.06481E+03	2.77243E+04	4.79182E+03	-3.33479E+02	1.92915E+02	-9.41956E+03
119	313	-5.36911E+01	2.66410E+04	3.77988E+03	3.38000E+03	-1.39887E+03	-9.43658E+03
119	321	-9.71535E+01	2.29102E+04	2.15435E+03	-4.35110E+03	1.72713E+03	-4.88487E+03
119	322	-4.73302E+02	2.39835E+04	2.85600E+03	-8.73924E+02	-3.89649E+01	-6.11802E+03
119	323	-1.56905E+03	2.34771E+04	2.71740E+03	2.76043E+03	-1.50833E+03	-6.53243E+03
119	331	-9.52642E+02	2.06443E+04	3.23398E+02	-4.65116E+03	1.24966E+03	-1.58443E+03
119	332	-1.55005E+03	2.18078E+04	1.61664E+03	-1.26316E+03	-3.97198E+02	-3.10784E+03
119	333	-2.74910E+03	2.16272E+04	2.20578E+03	2.30770E+03	-1.74924E+03	-3.85925E+03
120	111	5.49424E+02	-4.36353E+02	2.27075E+03	-4.64267E+02	7.78957E+02	-1.22222E+03
120	112	-1.50046E+03	-6.21186E+02	3.45790E+02	6.72396E+02	9.14955E+02	-1.02936E+03
120	113	-3.03555E+03	5.40591E+02	-1.18143E+03	9.26117E+02	1.08343E+02	-7.86014E+02
120	121	-2.94671E+02	-1.02007E+03	1.82640E+03	1.15987E+02	4.44532E+02	-1.11236E+03
120	122	-3.19252E+03	-1.39345E+03	-1.46748E+02	5.19310E+02	-8.35775E+02	-6.35775E+02
120	123	-5.57168E+03	-4.47491E+02	-1.76121E+03	1.95826E+03	5.73852E+02	-4.98900E+02
120	131	-9.59515E+02	-1.52787E+03	1.55320E+03	7.20409E+02	2.24441E+02	-1.08659E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
120	132	-4.71053E+03	-2.11804E+03	-6.15748E+02	2.28251E+03	2.47627E+02	-7.41490E+02
120	133	-7.94160E+03	-1.41977E+03	-2.31467E+03	3.00598E+03	2.04542E+02	-3.27559E+02
120	211	3.65231E+02	7.85502E+02	-2.66829E+03	-3.69595E+02	1.30009E+02	2.67907E+03
120	212	-1.08089E+03	2.33989E+02	1.74442E+03	1.04099E+03	9.71319E+02	2.63119E+03
120	213	-2.03270E+03	8.33318E+02	1.29812E+03	1.96188E+03	2.01005E+03	2.33409E+03
120	221	3.48979E+01	1.29360E+03	-2.75685E+03	-4.65953E+02	-1.29189E+02	2.03026E+03
120	222	-1.96330E+03	7.26014E+02	1.59131E+03	1.09765E+03	5.90568E+02	2.09815E+03
120	223	-3.45838E+03	1.29894E+03	9.47136E+02	2.16040E+03	1.45734E+03	1.93726E+03
120	231	-1.52812E+02	1.83003E+03	3.02610E+03	-4.91674E+02	-2.72572E+02	1.36605E+03
120	232	-2.71580E+03	1.20822E+03	1.56905E+03	1.22602E+03	3.36668E+02	1.53060E+03
120	233	-4.77019E+03	1.71307E+03	6.69423E+02	2.43479E+03	1.04880E+03	1.48465E+03
120	311	-5.15051E+01	7.82261E+03	1.95342E+03	-1.45355E+03	-3.76110E+02	5.16367E+03
120	312	-8.74903E+02	7.21537E+03	1.77417E+03	4.47183E+02	8.31633E+02	5.53790E+03
120	313	-1.20874E+03	7.47277E+03	2.30910E+03	2.19561E+03	2.13836E+03	5.48921E+03
120	321	-2.07971E+02	8.35694E+03	2.72953E+03	-1.91503E+03	-1.06503E+02	3.71114E+03
120	322	-1.34707E+03	7.76559E+03	2.03523E+03	8.64479E+01	9.58536E+02	4.10641E+03
120	323	-1.99127E+03	8.03510E+03	2.08284E+03	1.89886E+03	2.08835E+03	4.10499E+03
120	331	-2.42375E+02	8.94969E+03	3.67047E+03	-2.28833E+03	2.64631E+02	2.31668E+03
120	332	-1.71099E+03	8.34213E+03	2.43708E+03	-1.80630E+02	1.19574E+03	2.72017E+03
120	333	-2.68218E+03	8.58407E+03	1.96780E+03	1.70644E+03	2.16137E+03	2.75079E+03

APPENDIX H. OUTLET HEADER: 90% STEAM FLOW, 350 DEGREES

I/C

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
55	111	-1.96024E+03	2.93929E+04	4.49096E+03	-1.94933E+03	2.18636E+03	-1.75996E+04
55	112	-2.09028E+03	2.60172E+04	3.62553E+03	-3.30956E+03	2.23458E+03	-1.60484E+04
55	113	-1.88976E+03	2.34629E+04	3.04573E+03	-4.71094E+03	2.20947E+03	-1.55493E+04
55	121	3.28455E+02	3.64339E+04	5.48052E+03	-7.38784E+02	1.11705E+03	-1.30552E+04
55	122	-1.43206E+02	3.23601E+04	4.72520E+03	-2.25939E+03	1.25342E+03	-1.24243E+04
55	123	3.80311E+02	2.89272E+04	4.11630E+03	-3.81237E+03	1.31029E+03	-1.19845E+04
55	131	2.37829E+03	4.27675E+04	6.30776E+03	-2.01373E+02	3.30569E+02	-8.39423E+02
55	132	1.58815E+03	3.80402E+04	5.70073E+03	-1.85689E+02	3.37336E+02	-8.30119E+03
55	133	9.51274E+02	3.37967E+04	5.11889E+03	-3.56125E+03	6.59317E+02	-8.34602E+03
55	211	-2.45980E+03	2.49477E+03	3.54535E+03	-1.71559E+01	2.40171E+03	-7.9884E+03
55	212	-1.77727E+03	2.07093E+03	2.01627E+03	-1.25084E+02	2.15302E+03	-6.39903E+03
55	213	-9.24640E+02	1.80602E+03	8.94624E+02	-2.44909E+03	1.88667E+03	-5.19228E+03
55	221	-1.21887E+03	8.60529E+03	6.25697E+03	-4.51490E+02	1.39498E+03	-7.05915E+03
55	222	-8.47824E+02	7.32521E+03	4.63888E+03	-9.48434E+02	1.29642E+03	-5.77952E+03
55	223	-3.99899E+02	6.05331E+03	3.26416E+03	-2.34878E+03	1.17083E+03	-4.75159E+03
55	231	-3.23844E+02	1.39612E+04	8.49960E+03	-5.52835E+02	5.78459E+02	-5.86490E+03
55	232	-2.35944E+02	1.18776E+04	6.82948E+03	-1.00935E+03	6.23136E+02	-4.83881E+03
55	233	-1.52526E+02	9.67056E+03	5.26686E+03	-2.56671E+03	6.31919E+02	-3.99679E+03
55	311	-2.48110E+03	-1.72495E+03	6.04835E+03	-1.94761E+02	-3.75471E+02	4.00299E+02
55	312	-1.82763E+03	-1.02384E+03	2.84547E+03	-2.79042E+02	-1.18716E+01	9.32953E+02
55	313	-1.55330E+03	-1.41658E+03	5.27948E+02	-3.07609E+02	3.48067E+02	1.43387E+03
55	321	-2.19167E+03	-9.54958E+02	9.84163E+03	-1.97887E+02	-5.56824E+02	-4.02407E+02
55	322	-1.47292E+03	-5.60784E+02	6.79070E+03	-5.62001E+02	-6.150048E+01	9.18952E+01
55	323	-1.19599E+03	-1.33638E+03	3.43579E+03	-8.69173E+02	4.12869E+02	6.11350E+02
55	331	-2.23808E+03	-6.46599E+02	1.29077E+04	-3.16704E+02	-7.12262E+02	-7.42834E+02
55	332	-1.44475E+03	-5.41633E+02	1.00227E+04	-9.62349E+02	-7.77854E+01	-3.20257E+02
55	333	-1.14792E+03	-1.67265E+03	6.71709E+03	-1.54996E+03	5.33761E+02	1.77166E+02
56	111	4.53244E+02	5.77787E+04	7.16962E+03	2.88591E+03	2.50627E+02	1.82079E+04
56	112	1.98622E+03	5.76707E+04	8.46592E+03	3.73298E+03	9.31461E+02	1.88125E+04
56	113	3.35718E+03	5.70735E+04	9.69906E+03	4.59088E+03	1.57602E+04	1.86442E+04
56	121	-1.20248E+03	5.21510E+04	3.92117E+03	2.43486E+03	-8.85456E+01	1.19081E+04
56	122	-1.92313E+02	5.10802E+04	4.67823E+02	3.07738E+03	6.63406E+02	1.28528E+04
56	123	7.59619E+02	4.97772E+04	5.46643E+03	2.76929E+03	1.37749E+02	1.30440E+04
56	131	-1.52610E+03	4.99843E+04	2.22709E+03	2.45104E+03	-3.90135E+02	6.15953E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
56	132	-1.11998E+03	4.77620E+04	2.38146E+03	2.86130E+03	4.21740E+02	7.42073E+03
56	133	-6.81281E+02	4.5921E+04	2.64947E+03	3.27527E+03	1.19429E+03	7.96475E+03
56	211	-2.26369E+03	8.39943E+04	9.00896E+03	7.04373E+01	-1.77999E+03	3.60556E+01
56	212	3.22291E+03	8.34194E+04	8.96547E+03	1.18929E+02	1.04870E+02	9.84216E+00
56	213	3.42091E+03	8.11095E+04	8.09783E+03	1.62889E+02	1.92390E+03	-3.24512E+02
56	221	5.79707E+02	7.13747E+04	4.07246E+03	1.03018E+02	-1.81861E+03	4.60827E+01
56	222	3.18092E+02	7.08145E+04	4.24433E+03	-8.55286E+01	2.11412E+00	-3.99700E+01
56	223	5.83901E+02	6.88308E+04	3.72319E+03	-2.83238E+02	1.75705E+03	-4.49160E+02
56	231	-1.76687E+03	6.28749E+04	8.52499E+02	8.81863E+01	-1.78929E+03	2.70994E+01
56	232	-1.05523E+03	6.20390E+04	1.11644E+03	-3.32643E+02	-3.25746E+01	-1.01336E+02
56	233	-8.61263E+02	6.00510E+04	8.02015E+02	-7.66648E+02	1.65838E+03	-5.66160E+02
56	311	5.61849E+02	5.91295E+04	8.82045E+03	-2.64843E+03	1.11356E+02	-1.89421E+04
56	312	-2.09334E+03	5.95370E+04	9.84564E+03	-3.36490E+03	1.07177E+03	-1.93096E+04
56	313	2.86059E+03	5.83376E+04	9.87555E+03	-4.08918E+03	1.94588E+03	-1.95359E+04
56	321	-1.52860E+03	5.22084E+04	4.28655E+03	-1.86467E+03	-3.24469E+02	-1.26251E+04
56	322	-2.65822E+02	5.21453E+04	5.46798E+03	-2.79022E+03	6.50136E+02	-1.34159E+04
56	323	3.38380E+02	5.07477E+04	5.80621E+03	-3.77765E+03	1.54033E+03	-1.41111E+04
56	331	-1.98456E+03	4.89993E+04	1.48286E+03	-1.60547E+03	-5.62576E+02	-6.90608E+03
56	332	-1.12227E+03	4.81855E+04	2.73328E+03	-2.75645E+03	4.11161E+02	-8.07951E+03
56	333	-8.11757E+02	4.62751E+04	3.23423E+03	-3.95489E+03	1.30215E+03	-9.19698E+03
57	111	-4.27000E+03	-3.77862E+03	3.64903E+03	7.80719E+02	-1.88796E+03	-1.78916E+03
57	112	-2.60653E+03	-3.22138E+03	1.33307E+03	4.77050E+02	-5.74869E+02	-2.06517E+03
57	113	-1.24247E+03	-3.33739E+03	-1.31055E+03	4.71506E+02	6.61134E+02	-2.13119E+03
57	121	-3.50133E+03	-3.35385E+03	7.41527E+03	1.04344E+03	-1.29589E+03	7.33087E+02
57	122	-2.59635E+03	-2.98836E+03	4.79476E+03	9.24545E+02	-2.89362E+00	-3.29428E+02
57	123	-2.01140E+03	-3.33913E+03	1.82048E+03	1.10632E+03	1.23447E+03	-1.28122E+03
57	131	-2.98040E+03	-3.24601E+03	1.08307E+04	1.27088E+03	-8.52306E+01	-2.83827E+03
57	132	-2.89005E+03	-3.12074E+03	7.77097E+03	1.33786E+03	1.19899E+03	9.99959E+02
57	133	-3.13854E+03	-3.74880E+03	4.32753E+03	1.70766E+03	2.44617E+03	-7.95595E+02
57	211	-1.42038E+03	2.88429E+03	3.53023E+03	-1.23341E+02	1.74703E+03	5.47683E+03
57	212	-7.87392E+02	1.36875E+03	1.30200E+03	9.89679E+02	1.93411E+03	4.76944E+03
57	213	4.02244E+02	1.10156E+03	-3.20113E+02	2.24304E+03	1.99372E+03	4.16034E+03
57	221	-4.75401E+02	8.36093E+03	5.01134E+03	-9.61208E+01	7.84666E+02	5.47509E+03
57	222	-2.21899E+02	6.46537E+03	3.12842E+03	9.34952E+02	1.06362E+03	4.61269E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
57	223	5.10747E+02	5.64368E+03	1.76864E+03	2.11791E+03	1.23542E+03	3.76267E+03
57	231	1.33514E+02	1.31767E+04	6.39253E+03	1.72554E+02	2.64115E+02	5.16357E+03
57	232	-4.99951E+01	1.08726E+04	4.69107E+03	1.11674E+03	6.26453E+02	4.14067E+03
57	233	1.78041E+02	9.48991E+03	3.44055E+03	2.2293E+03	8.99396E+02	3.05506E+03
57	311	-1.91900E+03	2.71152E+04	3.02364E+03	1.68650E+03	2.07954E+02	1.55373E+04
57	312	-2.42877E+03	2.25864E+04	1.44685E+03	3.16183E+03	1.96026E+03	1.48533E+04
57	313	-1.91670E+03	2.03612E+04	9.73292E+02	4.64742E+03	1.76677E+03	1.38059E+04
57	321	3.10236E+02	3.45819E+04	4.25310E+03	1.06064E+03	1.02201E+03	1.09710E+04
57	322	-4.35591E+02	2.95889E+04	2.77557E+03	2.27386E+03	1.01676E+03	1.08706E+04
57	323	-2.70374E+02	2.66461E+04	2.29126E+03	3.51433E+03	9.50668E+02	1.03487E+04
57	331	2.14367E+03	4.12739E+04	5.49869E+03	1.02160E+03	1.55165E+02	6.39154E+03
57	332	1.11851E+03	3.58000E+04	3.99304E+03	1.94842E+03	2.46169E+02	6.82966E+03
57	333	9.07769E+02	3.21555E+04	3.38142E+03	2.91752E+03	2.87927E+02	6.79534E+03
58	111	-1.66684E+03	2.87306E+04	6.01921E+03	1.16454E+03	-1.44877E+03	-1.78106E+04
58	112	-2.62317E+03	2.36758E+04	3.75338E+03	2.99985E+03	-1.73866E+03	-1.65540E+04
58	113	-2.16383E+03	2.12272E+04	3.60747E+03	4.80174E+03	-2.00569E+03	-1.50202E+04
58	121	1.87496E+02	3.55548E+04	8.19351E+03	8.60781E+02	-8.78603E+02	-1.35776E+04
58	122	-1.02250E+03	3.00278E+04	5.5312E+03	2.42391E+03	-1.44504E+03	-1.27139E+04
58	123	-9.01964E+02	2.68867E+04	4.94244E+03	3.97448E+03	-2.00498E+03	-1.15352E+04
58	131	1.46743E+03	4.14487E+04	9.74696E+03	1.06765E+03	-4.34982E+02	-9.08265E+03
58	132	9.05945E+01	3.55515E+04	6.89085E+03	2.34057E+03	-1.26521E+03	-8.68581E+03
58	133	-2.98287E+01	3.18484E+04	6.03847E+03	3.61933E+03	-2.10321E+03	-7.94076E+03
58	211	-2.90149E+03	3.07015E+03	1.14065E+04	-5.17282E+02	-1.16178E+02	-1.11153E+04
58	212	-2.45803E+03	1.68200E+03	8.57487E+03	6.26068E+02	-6.21213E+02	-8.77148E+03
58	213	-1.20495E+03	1.72488E+03	7.01419E+03	1.87594E+03	3.13804E+01	-8.66125E+03
58	221	-1.74835E+03	8.72353E+03	1.42124E+04	-4.35125E+02	-1.32350E+03	-9.11173E+03
58	222	-2.01653E+03	6.60510E+03	1.07228E+04	2.90941E+02	-8.60529E+02	-7.39835E+02
58	223	-1.51826E+03	5.78235E+03	8.49593E+03	1.81384E+03	-3.10886E+02	-5.84684E+03
58	231	-1.15511E+03	1.34848E+04	1.62944E+04	-1.51651E+02	-1.23873E+03	-6.70083E+03
58	232	-2.04553E+03	1.07514E+04	1.23282E+04	8.30622E+02	-8.48776E+02	-5.66915E+03
58	233	-2.20715E+03	9.19554E+03	9.61771E+03	1.94588E+03	-3.94274E+02	-4.74002E+03
58	311	4.44344E+03	5.40452E+03	2.89419E+04	7.68717E+02	-9.77222E+02	1.55514E+03
58	312	4.22128E+03	4.24792E+03	2.20686E+04	4.19631E+02	-1.87312E+02	2.02533E+03
58	313	3.97168E+03	2.67225E+03	1.55274E+04	3.60108E+02	6.81188E+02	2.03168E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
58	321	3.37700E+03	4.03366E+03	2.85525E+04	1.00751E+03	-1.52424E+03	2.81447E+03
58	322	2.84487E+03	3.12037E+03	2.23819E+04	8.47067E+02	-5.46488E+02	2.41767E+03
58	323	2.29726E+03	1.77910E+03	1.65918E+04	9.79379E+02	4.83027E+02	1.63985E+03
58	331	1.98313E+03	2.25764E+03	2.76149E+04	1.20346E+03	-1.39196E+03	4.53129E+03
58	332	1.17095E+03	1.62651E+03	2.22066E+04	1.23333E+03	-2.38485E+02	3.22675E+03
58	333	3.54109E+02	5.60183E+02	1.72219E+04	1.55818E+03	9.43298E+02	1.61347E+03
59	111	3.21693E+02	6.04342E+04	9.85544E+03	-2.06367E+03	-1.31057E+02	2.13043E+04
59	112	1.11616E+03	6.07186E+04	1.04627E+04	-2.59342E+03	-1.37782E+03	2.09403E+04
59	113	1.49054E+03	5.97083E+04	1.09504E+04	-3.12932E+03	-2.66787E+03	2.05493E+04
59	121	-1.71559E+03	5.28465E+04	5.73577E+03	-1.36276E+03	1.22565E+02	1.51294E+04
59	122	-9.68232E+02	5.27900E+04	6.27881E+03	-2.17668E+03	-1.44384E+03	1.52448E+04
59	123	-5.48455E+02	5.16474E+04	6.80467E+03	-3.01608E+03	-3.05336E+03	1.53697E+04
59	131	-1.83830E+03	4.90367E+04	3.45717E+03	-1.12258E+03	3.08768E+02	9.51328E+03
59	132	-1.24764E+03	4.83709E+04	3.83537E+03	-2.22199E+03	-1.56103E+03	1.00872E+04
59	133	-9.03422E+02	4.68009E+04	4.28607E+03	-3.32634E+03	-3.47387E+03	1.07023E+04
59	211	2.25408E+03	8.26567E+04	8.56638E+03	9.27858E+02	1.94937E+03	6.21288E+02
59	212	2.47561E+03	8.14946E+04	7.87170E+03	9.99789E+02	-2.59479E+02	3.35811E+02
59	213	2.41800E+03	7.91819E+04	7.37905E+03	1.06688E+03	-2.50936E+03	4.71832E+02
59	221	-4.38119E+02	7.05682E+04	3.84635E+03	7.26788E+02	2.05599E+03	7.30723E+02
59	222	3.24160E+01	6.96015E+04	3.51681E+03	5.42345E+02	-3.80863E+02	4.89993E+02
59	223	3.23999E+02	6.77211E+04	3.48948E+03	3.36185E+02	-2.85897E+03	6.84325E+02
59	231	-1.34637E+03	6.24738E+04	8.45052E+02	5.05504E+02	2.09387E+03	8.25555E+02
59	232	-7.43570E+02	6.14242E+04	7.62692E+02	7.18071E+01	-5.71210E+02	6.39155E+02
59	233	-2.33004E+02	5.96675E+04	1.07026E+03	-3.84669E+02	3.27781E+03	8.99792E+02
59	311	1.47837E+03	5.71524E+04	8.59094E+03	3.25128E+03	-3.74079E+02	-1.69607E+04
59	312	1.97309E+03	5.58084E+04	8.19435E+03	4.09858E+03	-1.43127E+03	-1.77124E+04
59	313	2.71900E+03	5.44429E+04	8.63323E+03	4.90764E+03	-2.52099E+03	-1.75955E+04
59	321	-5.46273E+02	5.22542E+04	4.78529E+03	2.62978E+03	2.60877E+02	-1.10415E+04
59	322	-1.11990E+02	5.02837E+04	4.49648E+03	3.31550E+03	-1.13861E+03	-1.20791E+04
59	323	6.47544E+02	4.84863E+04	5.11261E+03	3.94409E+03	-2.57132E+03	-1.22604E+04
59	331	-1.22651E+03	5.05710E+04	2.50768E+03	2.46124E+03	7.35648E+02	-5.65549E+03
59	332	-9.44867E+02	4.77705E+04	2.23422E+03	2.95884E+03	-9.95380E+02	-6.95111E+03
59	333	-2.69538E+02	4.53133E+04	2.92675E+03	3.42044E+03	-2.76022E+03	-7.40077E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
60	111	1.42903E+03	2.97737E+03	1.86934E+04	-4.29749E+02	-7.06586E+02	1.40402E+03
60	112	1.08914E+03	2.72134E+03	1.33678E+04	-3.71540E+02	-5.90761E+02	3.61280E+02
60	113	2.42833E+02	1.19193E+03	7.62915E+03	-2.39491E+02	-4.58441E+02	-5.29618E+01
60	121	1.09533E+03	2.94828E+03	2.08362E+04	-4.23722E+02	-1.10399E+02	2.16677E+03
60	122	1.00389E+03	2.55366E+03	1.60009E+04	-6.154307E+02	-6.94957E+02	1.19467E+03
60	123	4.36214E+02	9.06307E+02	1.08317E+04	-8.11118E+02	-2.61343E+02	8.16017E+02
60	131	5.90915E+02	2.60434E+03	2.25536E+04	-5.30815E+02	-1.51844E+03	2.49675E+03
60	132	7.24797E+02	2.05358E+03	1.81429E+03	-1.05201E+03	-8.27413E+02	1.62349E+03
60	133	4.04294E+02	2.68242E+02	1.34661E+04	-1.49947E+03	-1.11694E+02	1.31296E+03
60	211	-2.32503E+03	6.10099E+03	1.22882E+04	-4.30126E+02	-2.19833E+02	1.25383E+04
60	212	-2.34309E+03	5.18201E+03	9.98506E+03	-1.32338E+03	-1.93625E+03	1.01573E+04
60	213	-2.49340E+03	3.91442E+03	7.59182E+03	-2.10927E+03	-1.67048E+03	8.30874E+03
60	221	-1.41137E+03	1.11169E+04	1.39669E+04	4.54594E+01	-1.88665E+03	1.13635E+04
60	222	-1.58079E+03	9.41642E+03	1.15609E+04	-1.01812E+03	-1.63607E+03	9.28866E+03
60	223	-1.87863E+03	7.32897E+03	9.12103E+03	-1.77253E+02	-1.38153E+03	7.72413E+03
60	231	-5.40123E+02	1.56234E+04	1.54857E+04	1.77253E+02	-1.67745E+03	9.88735E+03
60	232	-8.52690E+02	1.31733E+04	1.29835E+04	-1.07708E+03	-1.43723E+03	8.113649E+03
60	233	-1.29029E+03	1.03029E+04	1.04855E+04	-2.26534E+03	-1.19284E+03	6.87646E+03
60	311	-1.54617E+03	3.47783E+04	8.91183E+03	-1.98427E+03	-2.21546E+03	2.2127E+04
60	312	-2.34730E+03	3.11113E+04	7.99919E+03	-3.11523E+03	-2.55852E+03	2.03023E+03
60	313	-2.82045E+03	2.79975E+04	7.63224E+03	-4.19495E+03	-2.91376E+03	1.86937E+04
60	321	5.10119E+02	4.04517E+04	9.73722E+03	-7.75500E+02	-1.56563E+03	1.74586E+04
60	322	-5.50710E+02	3.59814E+04	8.48981E+03	-2.10671E+03	-2.18657E+03	1.60861E+04
60	323	-1.30715E+03	3.19788E+04	7.79398E+03	-3.38606E+03	-2.81964E+03	1.50121E+04
60	331	2.76114E+03	4.57713E+04	1.07116E+04	-1.82811E+02	-1.04465E+03	1.26634E+03
60	332	1.46330E+03	4.05411E+04	9.15918E+03	-1.69898E+03	-1.93261E+03	1.18439E+04
60	333	4.49375E+02	3.57045E+04	8.16367E+03	-3.16462E+03	-2.83273E+03	1.13198E+04
115	111	-7.50165E+01	5.71918E+03	1.29447E+03	-7.44672E+02	-1.75662E+02	-3.72070E+03
115	112	-1.17508E+03	4.89077E+03	9.44081E+02	1.16522E+03	-1.35141E+03	-4.11987E+03
115	113	-1.69134E+03	5.19283E+03	1.35515E+03	2.91804E+03	-2.66313E+03	-4.03695E+03
115	121	-2.6925E+02	6.10492E+03	2.14491E+03	-1.26764E+03	-2.97804E+02	-2.59507E+03
115	122	-1.68020E+03	5.38045E+03	1.82537E+02	1.35869E+03	-1.35815E+03	-3.01024E+03
115	123	-2.51777E+03	5.74425E+03	1.27255E+03	2.63279E+03	-2.51490E+03	-2.96252E+03
115	131	-3.63939E+02	6.55346E+03	3.12902E+03	-1.68938E+03	-5.25651E+02	-1.51786E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
115	132	-2.10093E+03	5.89011E+03	1.80879E+03	5.06610E+02	-1.47958E+03	-1.93472E+03
115	133	-3.27757E+03	6.27237E+03	1.26351E+03	2.46594E+03	-2.49499E+03	-1.90608E+03
115	211	3.3830E+02	2.95199E+02	1.80180E+03	-5.41826E+01	-8.35505E+02	-1.80024E+03
115	212	-1.23896E+03	-3.55824E+02	8.9637E+02	1.45369E+03	-1.63118E+03	-1.78298E+03
115	213	-2.22058E+03	3.90162E+02	4.61290E+02	2.40678E+03	-2.68011E+03	-1.51566E+03
115	221	-7.41992E+01	5.65495E+02	1.89725E+02	-1.37392E+02	-4.82594E+02	-1.23475E+03
115	222	-2.26726E+03	6.28001E+01	6.64480E+02	1.56404E+03	-1.16281E+03	-1.33431E+03
115	223	-3.86856E+03	6.77783E+02	2.27283E+01	2.65738E+03	-2.03746E+03	-1.19561E+03
115	231	-3.35699E+02	8.92327E+02	2.09555E+03	-1.452869E+02	-2.48511E+02	-6.66195E+02
115	232	-3.15667E+03	2.44780E+02	5.70885E+02	1.71366E+03	-8.25968E+02	-8.61685E+02
115	233	-5.39194E+03	9.28808E+02	-3.41669E+02	2.99226E+03	-1.54637E+03	-8.29744E+02
115	311	3.88368E+02	-7.32955E+02	1.85974E+03	-4.27423E+02	-1.41168E+03	1.56591E+03
115	312	-1.56514E+03	7.40681E+02	1.30870E+02	8.41142E+02	-1.51519E+03	1.37566E+03
115	313	-2.94998E+03	7.29019E+02	-1.14571E+03	1.09126E+03	-1.68205E+03	1.08859E+03
115	321	-5.51354E+02	-1.36748E+03	1.16324E+03	2.03876E+02	-1.05270E+03	1.54634E+03
115	322	-3.49614E+03	-1.59447E+03	-7.10764E+02	1.70380E+03	-1.08555E+03	1.24362E+03
115	323	-5.87486E+03	-3.82415E+02	-2.10309E+03	2.21076E+03	-1.12008E+03	8.64543E+02
115	331	-1.27902E+03	-1.89381E+03	6.79629E+02	8.62840E+02	-8.07254E+02	1.56079E+03
115	332	-5.21542E+03	-2.36803E+03	-1.40542E+03	2.58992E+03	-7.82125E+02	1.18724E+03
115	333	-8.59027E+03	-1.44265E+03	-2.9569E+03	3.34935E+03	-7.04843E+02	7.32807E+02
116	111	6.96299E+02	2.38548E+04	4.41802E+03	-3.72393E+03	-2.03100E+03	8.16512E+03
116	112	6.65789E+02	2.46021E+04	4.42421E+03	-2.01778E+02	-2.04716E+02	8.97770E+03
116	113	-1.22404E+02	2.37474E+04	3.49831E+03	3.44143E+03	1.24435E+03	8.96657E+03
116	121	-7.11830E+02	1.97937E+04	1.84107E+03	-2.95044E+03	-1.74823E+03	4.97498E+03
116	122	-8.95548E+02	2.08976E+04	2.63345E+03	-5.85932E+02	-3.49092E+01	6.02977E+03
116	123	-1.70034E+03	2.06818E+04	2.69177E+03	2.93681E+03	1.30628E+03	6.31629E+03
116	131	-1.57808E+03	1.73287E+04	1.06240E+01	-4.07654E+03	-1.32698E+03	8.10183E+03
116	132	-2.01610E+03	1.86017E+04	1.51212E+03	-8.51680E+02	2.80754E+02	3.34664E+03
116	133	-2.95221E+03	1.88055E+04	2.18811E+03	2.56554E+03	1.51953E+03	3.87103E+03
116	211	2.03730E+03	2.73198E+04	2.26572E+03	-4.76618E+03	-1.66279E+02	-1.48706E+03
116	212	1.82868E+03	2.82575E+04	2.12491E+03	1.65972E+03	3.3467E+02	-4.35610E+02
116	213	1.04947E+03	2.76309E+04	1.62036E+03	1.45990E+03	6.03452E+02	2.60198E+02
116	221	3.96214E+02	2.31573E+04	8.63120E+02	-4.68031E+03	-8.05953E+01	-2.39935E+03
116	222	-9.05794E+01	2.40075E+04	8.66627E+02	-1.66673E+03	4.14540E+02	-1.13107E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
116	223	-1.03399E+03	2.35551E+04	6.18236E+02	1.39382E+03	6.43177E+02	-1.87576E+02
116	231	-7.52721E+02	2.03385E+04	9.59393E+00	-4.55967E+03	4.68280E+01	-3.26638E+03
116	232	-1.54956E+03	2.10384E+04	1.30471E+02	-1.59439E+03	5.19125E+02	-1.79798E+03
116	233	-2.69350E+03	2.06623E+04	9.66287E+01	1.40817E+03	7.23997E+02	-6.47962E+02
116	311	7.39205E+02	1.50138E+04	1.26883E+03	-4.71145E+03	1.40146E+03	-5.71313E+03
116	312	5.63844E+02	1.62171E+04	1.49803E+03	-2.28689E+03	5.12636E+02	-5.31001E+03
116	313	4.75958E+02	1.70262E+04	2.36475E+03	8.10824E+01	-4.93940E+02	-5.25225E+03
116	321	2.53375E+02	1.45604E+03	1.67455E+03	5.08244E+03	1.19080E+03	-4.09910E+03
116	322	-4.89740E+02	1.50087E+04	1.20225E+03	-2.62962E+03	4.09444E+02	-4.09802E+03
116	323	-1.06839E+03	1.52237E+04	1.40084E+03	-2.62962E+03	4.09444E+02	-4.09802E+03
116	331	1.10859E+02	1.48899E+04	2.42206E+03	-5.45245E+03	9.54356E+02	-3.86519E+03
116	332	-1.15762E+03	1.46505E+04	1.31532E+03	-2.95096E+03	2.69705E+02	-3.17077E+03
116	333	-2.23023E+03	1.43125E+04	9.06187E+02	-4.58381E+02	-5.45936E+02	-3.02615E+03
117	111	-3.62417E+03	-1.81579E+03	1.97324E+04	1.58078E+02	-1.10807E+03	2.37464E+03
117	112	-9.63164E+02	-1.23886E+03	1.68666E+04	4.37443E+02	-6.30688E+02	1.26233E+03
117	113	5.12255E+02	-3.93649E+03	1.32947E+04	1.69290E+03	-4.75438E+02	8.38605E+02
117	121	-2.03767E+03	-8.63241E+02	1.99231E+04	-1.15194E+02	-1.23159E+03	1.86335E+03
117	122	-6.65150E+02	8.70868E+02	1.72746E+04	1.22233E+03	-8.58571E+02	8.06844E+02
117	123	-6.22844E+02	-9.83090E+02	1.37421E+04	3.68840E+03	-7.46485E+02	2.96238E+02
117	131	-1.69382E+03	-6.74271E+02	1.95347E+04	1.37421E+04	-1.27134E+03	1.27480E+03
117	132	-1.69520E+03	2.26507E+03	1.71202E+04	1.70394E+03	-9.70728E+02	3.04759E+02
117	133	-3.16879E+03	1.30123E+03	1.36483E+04	5.27600E+03	-8.77618E+02	-2.44102E+02
117	211	-2.72258E+03	4.89810E+03	1.07332E+04	1.75669E+03	-3.84228E+02	8.87704E+03
117	212	-1.89444E+03	4.15899E+03	8.69626E+03	2.94737E+02	8.38366E+02	7.26207E+03
117	213	-1.13380E+03	2.77882E+03	7.06094E+03	2.90733E+03	1.48071E+03	6.39311E+03
117	221	-6.04385E+02	8.03016E+03	1.17643E+04	-2.44801E+03	-9.86358E+02	7.85266E+03
117	222	-8.58832E+02	7.58673E+03	1.25675E+02	1.25675E+02	8.00381E+01	6.22270E+03
117	223	-1.34968E+03	6.11312E+03	8.10949E+03	3.39334E+03	6.22556E+02	5.19555E+03
117	231	6.80669E+02	1.06177E+04	1.23797E+04	-3.31802E+03	-1.36839E+03	6.76777E+03
117	232	-6.81663E+02	1.05345E+04	1.06210E+04	-5.49031E+01	-4.32122E+02	5.15327E+03
117	233	-2.43200E+03	9.06393E+03	8.87158E+03	3.79333E+03	2.89885E+01	4.01598E+03
117	311	-9.44755E+02	1.65639E+04	4.88124E+03	-2.39490E+03	-1.41229E+03	1.11897E+04
117	312	-2.10902E+03	1.39828E+04	3.01740E+03	8.80127E+02	4.98543E+02	1.02511E+04
117	313	-2.70003E+03	1.24165E+04	2.05254E+03	4.32598E+03	1.88931E+03	9.47975E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
117	321	1.27266E+03	2.03583E+04	6.00794E+03	-3.62750E+03	-1.80774E+03	9.24160E+03
117	322	-4.58400E+02	1.77402E+04	4.65108E+03	-3.11203E+02	4.65578E+00	8.40940E+03
117	323	-1.78073E+03	1.57491E+04	4.00265E+03	3.24830E+03	1.32949E+03	7.64411E+03
117	331	3.65687E+03	2.38316E+04	6.89426E+03	-4.61531E+03	-1.91618E+03	7.26906E+03
117	332	7.79191E+02	2.12321E+04	6.10289E+03	-1.23796E+03	-1.88667E+02	6.56916E+03
117	333	-1.23836E+03	1.89238E+04	5.85569E+03	2.44930E+03	1.07833E+03	5.84797E+03
118	111	-1.61977E+03	1.59672E+04	3.24497E+03	-2.48611E+03	1.48789E+03	-1.08706E+04
118	112	-2.88912E+03	1.34185E+04	1.57346E+03	1.07647E+03	-6.16943E+02	-9.89526E+03
118	113	-3.55385E+03	1.18591E+04	9.29358E+02	4.77470E+03	-2.24084E+03	-9.11596E+03
118	121	9.61424E+02	2.05939E+04	5.24710E+03	-3.95474E+03	1.86352E+03	-9.00024E+03
118	122	-9.08978E+02	1.78707E+04	3.86112E+03	-3.05104E+02	-1.23562E+02	-8.17588E+03
118	123	-2.33799E+03	1.57466E+04	3.31635E+03	3.53275E+03	-1.66539E+03	-7.44779E+03
118	131	2.99024E+03	2.47955E+04	6.88060E+03	-5.13702E+03	1.96298E+03	-7.05498E+03
118	132	5.38834E+02	2.19629E+04	5.85139E+03	-1.37793E+03	7.92122E+01	-6.41459E+03
118	133	-1.60994E+03	1.93901E+04	5.49859E+03	2.65555E+03	-1.38929E+03	-5.78242E+03
118	211	-3.56843E+03	3.34867E+03	1.20633E+04	-1.84201E+03	2.99427E+02	-8.80461E+03
118	212	-2.82104E+03	2.91672E+03	9.86933E+03	3.26231E+02	-1.02004E+03	-7.03103E+03
118	213	-2.11038E+03	1.81217E+03	8.15642E+03	3.02630E+03	-1.76562E+03	-6.01923E+03
118	221	-1.39114E+03	6.96386E+03	1.31375E+04	-2.63889E+03	7.74948E+02	-7.81367E+03
118	222	-1.70577E+03	6.72839E+03	1.10151E+04	9.12569E+01	-3.87378E+02	-6.05436E+03
118	223	-2.24098E+03	5.43152E+03	9.17294E+03	3.32575E+03	-1.03655E+03	-4.91489E+03
118	231	-8.79744E+01	9.98131E+03	1.37829E+04	-3.46637E+03	1.03735E+03	-6.73383E+03
118	232	-1.50504E+03	1.00126E+04	1.17809E+04	-1.37117E+02	6.86446E+02	-5.02383E+03
118	233	-3.29264E+03	8.62430E+03	9.87656E+03	3.87998E+03	-5.63081E+02	-3.80905E+02
118	311	4.39545E+02	1.96121E+03	3.07976E+04	1.23490E+02	-6.38902E+01	-1.44583E+02
118	312	2.44790E+03	2.03880E+03	2.63297E+04	4.13373E+02	-4.32607E+02	7.90640E+02
118	313	3.29138E+03	-1.15074E+03	2.12182E+04	1.17190E+03	-4.70799E+02	1.01773E+03
118	321	1.45511E+03	2.45853E+03	2.95968E+04	-1.62796E+02	-1.29657E+02	2.19501E+02
118	322	2.72629E+03	3.76336E+03	2.55809E+04	1.19706E+03	-4.04400E+02	1.12299E+02
118	323	1.79080E+03	1.49008E+03	2.07496E+04	3.59812E+03	-4.14474E+02	1.45921E+03
118	331	1.29041E+03	2.25412E+03	2.79945E+04	-8.03051E+02	-2.66565E+02	6.94780E+02
118	332	8.24204E+02	4.82091E+03	2.44088E+04	1.67954E+03	-4.76050E+02	1.52787E+03
118	333	-1.08831E+03	3.49636E+03	1.98396E+04	5.27850E+03	-4.78337E+02	1.91686E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
119	111	1.06986E+03	1.78049E+04	2.06769E+03	-5.36280E+03	-1.59923E+03	6.27938E+03
119	112	1.07358E+03	1.90568E+04	2.21681E+03	-2.85337E+03	-7.41758E+02	6.26592E+03
119	113	1.19624E+03	1.98299E+04	3.19041E+03	-3.33772E+02	2.64909E+02	6.10458E+03
119	121	3.96189E+02	1.68284E+04	2.33226E+03	-5.71038E+03	-1.34396E+03	5.03049E+03
119	122	-2.12959E+02	1.73123E+04	1.72307E+03	-3.19593E+03	-6.24332E+02	4.84674E+03
119	123	-6.55440E+02	1.74544E+04	1.95823E+03	-7.12602E+02	2.48388E+02	4.51547E+03
119	131	1.33283E+02	1.67932E+04	3.01319E+03	-6.06434E+03	-2.105947E+03	3.91230E+03
119	132	1.05602E+03	1.65543E+04	1.70014E+03	-3.55021E+03	-4.64961E+02	3.58896E+03
119	133	-2.03868E+03	1.60893E+04	1.24706E+03	-1.05043E+03	2.85712E+02	3.11941E+03
119	211	2.28232E+03	2.99392E+04	2.36575E+03	-4.93231E+02	2.32978E+02	1.79880E+03
119	212	2.04645E+03	3.06999E+04	2.15390E+03	-1.74661E+03	-3.80607E+02	6.32200E+02
119	213	1.31098E+03	2.99304E+04	1.77025E+03	1.43743E+03	-7.43440E+02	-1.15781E+02
119	221	5.31437E+02	2.54429E+04	9.55101E+02	-4.92304E+03	1.25041E+02	2.79071E+03
119	222	1.65022E+01	2.61351E+04	8.00706E+02	-1.83522E+03	-4.73214E+02	1.36460E+03
119	223	-8.99813E+02	2.55210E+04	5.81195E+02	1.27570E+03	-8.20278E+02	3.25628E+02
119	231	-6.96419E+02	2.24210E+04	1.30820E+02	-4.86968E+03	-1.14260E+01	3.71967E+03
119	232	-1.52926E+03	2.29538E+04	5.81113E+00	-1.85195E+03	-5.94099E+02	2.06811E+02
119	233	-2.67731E+03	2.23747E+04	-1.00784E+02	1.21032E+03	-9.24996E+02	7.77094E+02
119	311	1.28445E+03	2.53386E+04	4.60012E+03	-3.48971E+03	1.94173E+03	-7.95602E+03
119	312	1.01189E+03	2.58844E+04	4.42334E+03	6.67014E+01	6.87345E+01	-8.77502E+03
119	313	-1.85241E+00	2.47764E+04	3.41765E+03	3.75170E+03	-1.48629E+03	-8.75260E+03
119	321	-1.61605E+02	2.14775E+04	2.08503E+03	-3.94967E+03	1.65389E+03	-4.48759E+03
119	322	-5.54400E+02	2.23626E+04	2.62648E+03	-4.84490E+02	-1.07080E+02	-5.64970E+03
119	323	-1.56757E+03	2.18339E+04	2.48277E+03	3.13613E+03	-1.55266E+03	-6.02174E+03
119	331	-1.08919E+03	1.92832E+04	3.96277E+02	-4.27920E+03	1.24706E+03	-1.34658E+03
119	332	-1.71326E+03	2.02933E+04	1.47188E+03	-8.86095E+02	-4.09539E+02	-2.79877E+03
119	333	-2.84862E+03	2.01023E+04	2.04669E+03	2.66699E+03	-1.75180E+03	-3.50476E+03
120	111	6.63445E+02	-5.24184E+02	2.77490E+03	-4.84866E+02	9.21171E+02	-1.31756E+03
120	112	-1.46113E+03	-6.90888E+02	5.59955E+02	7.89829E+02	1.05883E+03	-1.11110E+03
120	113	-3.03488E+03	-5.67368E+02	-1.20947E+03	-1.03931E+03	1.24477E+03	-8.48629E+02
120	121	-2.71986E+02	-1.12148E+03	2.07217E+03	1.48313E+02	5.82759E+02	-1.26439E+03
120	122	-3.38417E+03	-1.50514E+03	-2.65845E+02	-1.64990E+02	6.48988E+02	-9.72016E+02
120	123	-5.93864E+03	-4.89500E+02	-2.11014E+03	2.15230E+03	7.05020E+02	-6.11317E+02
120	131	-9.89036E+02	-1.60673E+03	1.59794E+03	8.09148E+02	3.59199E+02	-1.27650E+03

ELEMENT	POINT	STRESS-XX	STRESS-YY	STRESS-ZZ	STRESS-XY	STRESS-XZ	STRESS-YZ
120	132	-5.09191E+03	-2.23785E+03	-9.36047E+02	2.53352E+03	3.66282E+02	-9.14716E+02
120	133	-8.63325E+03	-1.49789E+03	-2.93674E+03	3.28449E+03	3.12102E+02	-4.75753E+02
120	211	5.46721E+02	8.59277E+02	3.03386E+03	-3.27836E+02	4.27326E+02	2.64132E+03
120	212	-9.90914E+02	2.32410E+02	1.80024E+03	1.22851E+03	1.26572E+03	2.52089E+03
120	213	-1.99868E+03	8.07455E+02	1.12248E+03	2.20233E+03	2.35119E+03	2.13821E+03
120	221	1.22137E+02	1.18548E+03	2.98469E+03	-3.97542E+02	1.15971E+02	1.97145E+03
120	222	-2.06463E+03	5.46033E+02	1.49919E+03	1.30944E+03	8.23432E+02	1.97230E+03
120	223	-3.70828E+03	1.10616E+03	6.12987E+02	2.42297E+03	1.72211E+03	1.73540E+03
120	231	-1.36683E+02	1.57971E+03	3.15966E+03	-3.89790E+02	-7.35390E+01	1.30313E+03
120	232	-2.98595E+03	8.84823E+02	1.35624E+03	1.46999E+03	5.16025E+02	1.40373E+03
120	233	-5.28261E+03	1.37872E+03	1.96514E+02	2.72878E+03	1.24791E+03	1.28866E+03
120	311	-1.53198E+01	7.25904E+03	1.99665E+03	-1.18839E+03	-8.65118E+01	4.87876E+03
120	312	-9.18267E+02	6.47922E+03	1.61056E+03	8.37813E+02	1.11959E+03	5.13485E+03
120	313	-1.28073E+03	6.60724E+03	2.06142E+03	2.66801E+03	2.47685E+03	4.95559E+03
120	321	-2.31660E+02	7.61366E+03	2.82250E+03	-1.67472E+03	1.05726E+02	3.53924E+03
120	322	-1.51935E+03	6.86628E+03	1.88967E+03	4.44495E+02	1.16563E+03	3.81601E+03
120	323	-2.25617E+03	7.02907E+03	1.82964E+03	2.32855E+03	2.33888E+03	3.68866E+03
120	331	-3.23953E+02	8.06032E+03	3.82024E+03	-2.06046E+03	4.08914E+02	2.26411E+03
120	332	-2.01274E+03	7.30223E+03	2.31053E+03	1.58496E+02	1.33242E+03	2.54607E+03
120	333	-3.14377E+03	7.45204E+03	1.70281E+03	2.10886E+03	2.33583E+03	2.45170E+03

LIST OF REFERENCES

1. Kitchin,D.R., *2-Dimensional Axisymmetric and 3-Dimensional Finite Element Stress Analysis of the LHA-1 Class Superheater Header*, Naval Postgraduate School, CA, March, 1988.
2. NAVSEA Technical Manual S9221-A3-MMO-020.LHA-1 CL Volume 2, *Description, Operation and Maintenance Instructions Type V2M Boiler*, Naval Sea System Command, Washington, D.C., 1979.
3. Kaufmann,J.W., *Stress Analysis of LHA-1 Class Superheater Header by Finite Element Method*, Naval Postgraduate School, CA, June, 1987.
4. ADINA Engineering, *ADINA Vol. 1, Report ARD 87-1*, ADINA R&D, Inc., Watertown, MA, December 1987.
5. ADINA Engineering, *ADINA-IX Users Manual, Report ARD 87-4*, ADINA R&D, Inc., Watertown, MA, December, 1987.
6. ADINA Engineering, *ADINA-T Users Manual, Report ARD 87-2*, ADINA R&D, Inc., Watertown, MA, December, 1987.
7. ADINA Engineering, *ADINA-PLOT Users Manual, Report ARD 87-7*, ADINA R&D, Inc., Watertown, MA, December 1987.
8. Metals Handbook, Ninth Edition, *Volume 1, Properties and Selection: Iron and Steels*, American Society for Metals, Metals Park, OH, September, 1987.

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